Electrical Review

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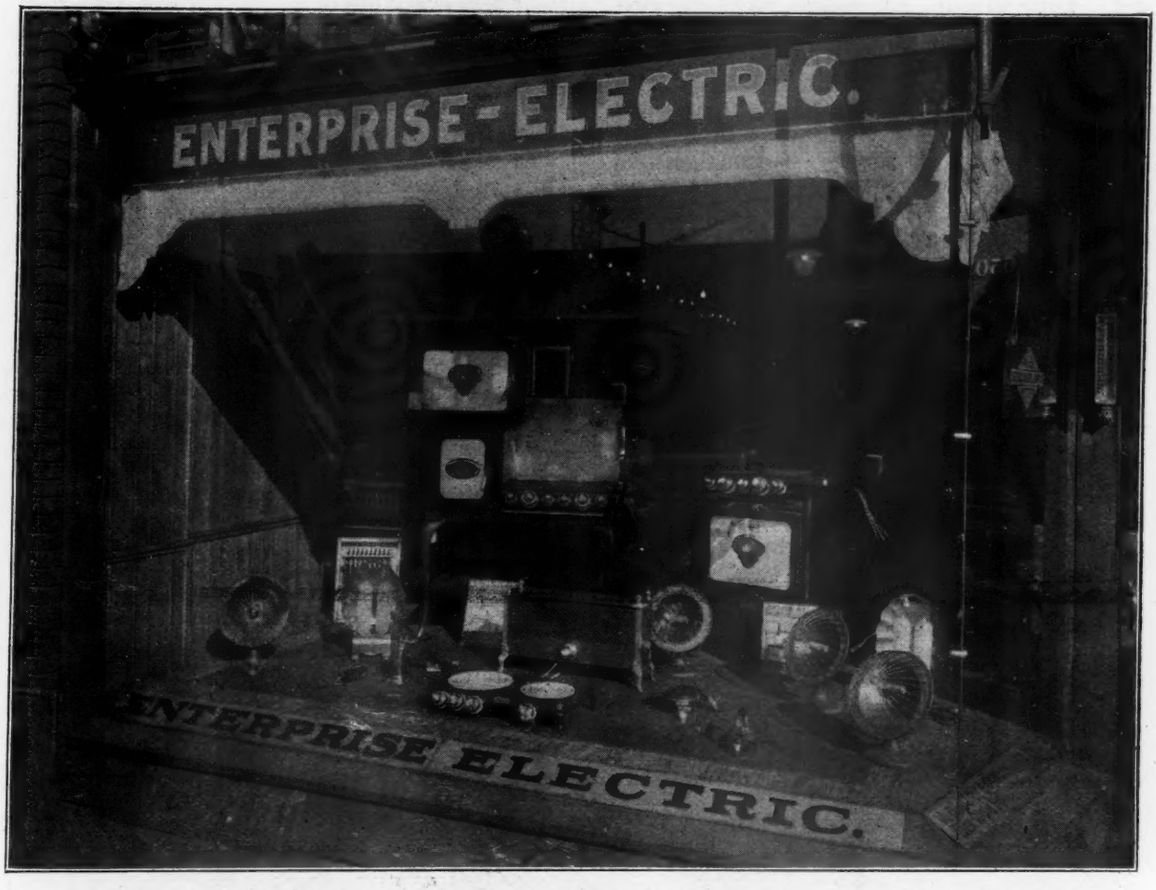


Fall and Winter Electrical Shopping Suggestions in Window Display of Enterprise Electric Co., Cleveland.

Fall Brings Impetus to Retail Electrical Trade

Contractor-Dealers Everywhere Preparing for Increased Demands for Electrical Wiring and Appliances—Seasonable Show Windows and Store Arrangements Show Taste and Merchandising Energy

By WILLIAM B. EASTWOOD

The fall and winter business outlook for the electrical contractor-dealer was never brighter in the opinion of a large number of retailers and jobbers who have been interviewed in person and by mail during the past few weeks. Even while they are preaching and practicing caution in stocking up, because of the uncertainty that seems to them to prevail in the market, dealers everywhere are following as never before the department-store idea of seasonable displays in window and on the store floor.

At the recent annual meeting of the Tennessee Association of Electrical Contractors and Dealers in Nashville, one of the most pointed and optimistic addresses was that on "Fall and Winter Outlook for Business," by C. R. Wright, of the Acme Electric Co., Knoxville, Tenn., who is an active contractor-dealer and second vice-president of the Tennessee association.

"Personal investigation discloses the fact," said Mr. Wright, "that the sale of electrical appliances is without exception increasing daily every-

where, due to the fact that more advertising is being done, and the public as a whole is being educated to the various uses to which these appliances are adapted, as well as to their conveniences. When you make the sale of an appliance that is not the end of it. The customer tells his friends and neighbors and it is not long before you have more sales as the result of the first. Consequently, an endless chain of customers is created as the result of each satisfactory sale.

"The housewife is growing more familiar with electrical appliances, and it is believed that in the near future every housewife will deem it as necessary to have an electric flatiron, vacuum cleaner and washing machine in her home as she did the old flatiron, broom, tubs and wash boilers. If we will advance the idea of the *real use* and *convenience* of these appliances to our customers there is no reason why our fall and winter business in this line will not show a decided increase as well as pave the way to far greater increase in the future.

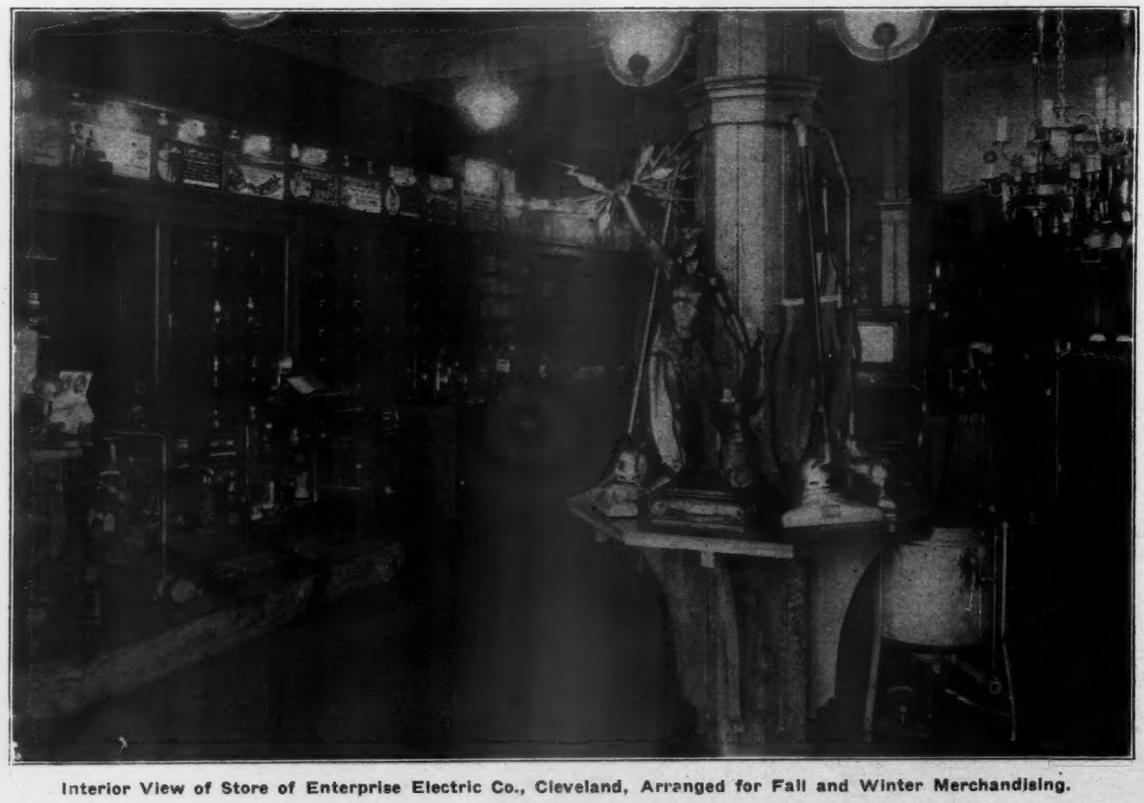
Promising Outlook for Electrical Contracting Side of Business.

"If you will follow closely the daily papers and leading weekly and monthly business journals you will find that business, with few exceptions, is upon an absolutely sound basis and there is no cause for alarm or fear of sudden panic in the immediate future. This means that the contracting or construction end of the electrical business certainly looks promising. We are, of course, passing slowly through a period of deflation in prices of some articles which, to some extent, is disquieting if not damaging. These conditions, however, are bound to exist to some extent until the whole country gets back to a normal basis. The lack of production and transportation shortage are the main reasons for our abnormal conditions just now, but with the railroads going back to private ownership, together with the increase in freight and passenger rates, they will be able to buy new equipment, make necessary repairs and extensions, and thereby give better transportation service. This, in turn, will help every business.

"Take the building industry on which a large proportion of the construction end of our business is dependent. For the first six months of 1920 there was a decided increase over the same period of 1919 despite the high prices. In the face of all this it is estimated the country is behind in its building program from one and a half to two years. With the cry throughout the whole country for homes to live in, the building industry cannot wait for lower prices.

"We know that supply and demand govern prices. Should everyone wait until prices are lower and all go into the market for materials, the demand thus created would surely recreate higher prices. The country continues to grow and it is absolutely necessary for more houses to be built to take care of the steadily increasing population. There is no reason, therefore, in view of the already alarming shortage of homes, to believe that the building industry will not continue as well as steadily improve.

"There are thousands of homes already in existence whose owners and occupants are only waiting to be approached and told of the conveniences to which electricity from the already existing lines of the public utilities may be adapted. They are waiting to be told that the low cost of wiring for and operation of these conveniences, as compared with other household necessities, is out of all proportion to the drudgery and



Interior View of Store of Enterprise Electric Co., Cleveland, Arranged for Fall and Winter Merchandising.

inconvenience of old methods as well as the higher cost of incompetent servants.

"With the present high cost of coal and other items which enter into the generation of steam power there is a world of steam power which can be converted to electric drive with much profit to the consumer. The electrical contractor will find the commercial man of the central-station company ever ready to go out with him and render valuable assistance on any proposition of this nature. Electrical service is economical in every respect. The broad field for uses to which it is adaptable leads to the belief that, with every contractor-dealer putting his shoulder to the wheel, sufficient business can be developed to keep us all busy from now on and still leave plenty for our great-grandchildren."

Window Displays That Reflect Coming of Fall and Winter.

When the summer sun is on the wane and there is the suggestion of tang in the evening air, what contractor-dealer can dispute the effectiveness of a well-arranged display of electric glow heaters in the show window as forecasting electrical comfort for the coming fall and winter seasons? With this suggestion the electrical heating device ceases to be merely an appliance. It offers a solution to the question of acquiring bodily comfort. This is particularly true in the face of the present shortage and high price of coal, and this is aside from the fact that the electric heater has certain advantages over coal heat at any price.

The window display of the Enterprise Electric Co., of Cleveland, a photograph of which is reproduced herewith, shows a clever combination of specialty and seasonable display. A series of electric heaters arranged in a semi-circle give a well-balanced effect to the window. The electric hotplate, flatiron, milk warmer and curling iron in the foreground call the observer's attention to the various labor-saving devices used in the home. In the background may be seen an automatic electric range which adds much to the attractiveness of the display. This particular window setting is doubly effective because, aside from its seasonableness, it also depicts to the spectator the various types of appliances which serve to lighten tasks and brighten the home through the medium of electricity.

This particular Cleveland dealer has carried the same tasty merchandising ideas of which the window display hints into the store, a view of which is also shown herewith. The store shows the application of various merchandising principles. One important feature is the way the various lines of merchandise are divided. The fixtures and lamp sales are all made on the right-hand side of the store as one enters, while the small appliances are displayed on the left. The back half of the store is partitioned off, giving an extra wall for display of wall-type fixtures and a storage room in the rear. The office is located at the extreme rear of the store, and is so constructed that by closing a door all detail business is concealed from the customer.

One good merchandising feature in this store is the use of the street-car cards displayed along the top of the wall cases. These are furnished by the manufacturer. They give a finished look to the shelves and also furnish some interesting and attractive reading matter and pictures for the customer to examine while the clerk is wrapping and billing his purchase. The showcase is well placed, but could be better arranged, and the light should be shaded to eliminate the glare.

What the Enterprise Electric Co. is doing in Cleveland in the way of seasonable window displays and better store arrangement the contractor-dealers are doing everywhere this season as they never did before. Their every effort in this direction is the best evidence of prosperity and confidence in the success of the fall and winter business in the electrical appliance trade this year.

HONOLULU SHOWS PROGRESSIVENESS ELECTRICALLY.

People who have the idea that the Hawaiian Islands are covered with palm trees and tropical foliage climbing the sides of volcanic peaks, among which the Hawaiians live in simplicity with nothing much more to do than play ukuleles, should see the electrical pages running every week in the Honolulu *Star-Bulletin*. The pages are well prepared, the advertising cuts and copy are good and the reading matter is supplied by the Society for Electrical Development, thus ensuring its accuracy and its interest for the readers.

Last year there was a territorial fair held in Honolulu. The Hawaiian Electric Co. had a building of its own as a part of the fair, and asked the Society for Electrical Development for suggestions. A six-page "special service" was sent, of which excellent use was made. The electrical exhibits and displays proved one of the great attractions of the fair.

There are many communities where the electrical interests could show a great deal more energy in their development work, and the Society for Electrical Development is extending its co-operation in the effort to secure publicity for the electrical industry.

EXAMINATION FOR COMMERCIAL-TELEPHONE ENGINEER.

An open competitive examination for commercial telephone engineer is announced by the United States Civil Service Commission, applications for which should be filed on or before Oct. 12. The duties of the position consist of the direct management and supervision of commercial telephone exchanges, and require intimate knowledge of the functions of the commercial and traffic forces, special and engineering contract work and accounting practice of rate-making. Vacancies in the signal service at large, for duty at Washington, D. C., New York City and Chicago, at entrance salaries ranging from $3000 to $4000 a year, and vacancies in position requiring similar qualifications, at these or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer or promotion.

Modern Electrical Conveniences in a Mountain Camp

Camp Curry, Calif., Enjoys Electric Lights, Electric Cooking, Baking, Heating, Hot Water Heaters and Many Other Electrical Comforts in Midst of Wild Surroundings Far From Railroads

By CHARLES MATTHEWS
Chief Electrician at Camp Curry, Calif.

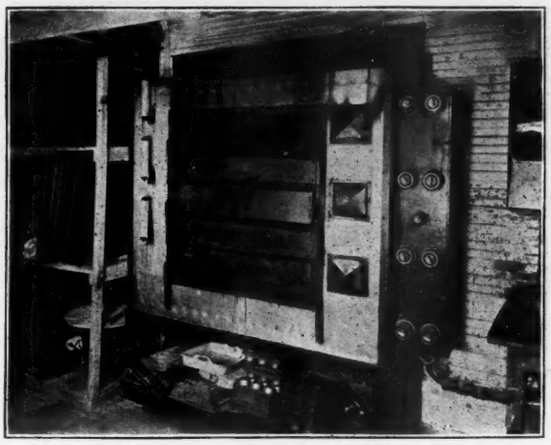
One of the last places a city dweller would expect to find intensive application of electricity would be high up in the western mountains, amid the most primitive surroundings and so far from the railroad that it can only be reached by stage coach and automobile. When one plans to take his vacation off somewhere in the wilds where he can camp out close to nature, his first thought is of open campfire cooking, washing in the cold mountain stream, candles or kerosene lanterns for evening light and plenty of blankets for chill, frosty nights of the high altitude. To find a camp, therefore, that affords all the untamed surroundings of wilderness life, yet with all the personal comforts and luxuries of modern hotel life in the city—electric lights, electric cooking, hot and cold water, electric heat and modern laundry—sounds almost like fiction until the facts are presented.

This unique combination of modern facilities in the midst of a primeval setting is to be found at Camp Curry, Yosemite Valley, California. At this place, 4000 ft. above sea level and 18 miles from the nearest railroad, approximately 1000 guests sleep in tents and bungalows, live out of doors and yet enjoy all the blessings of electric lights and electrical equipment of the most modern type. Proximity to almost limitless water power and the consequent low cost of electricity, together with the determination of the camp management to provide modern service, have combined to introduce the wide use of electric appliances at Camp Curry.

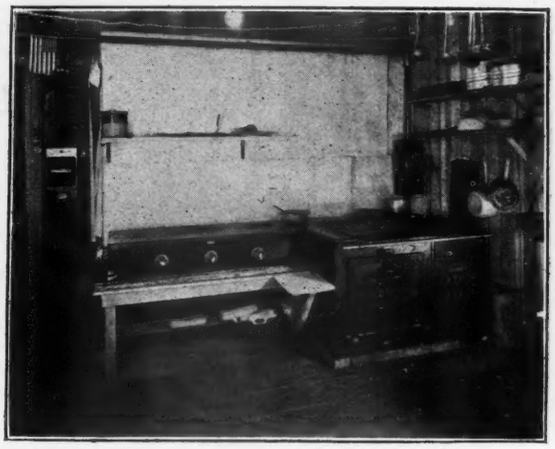
Modern Electric Cooking Equipment in Mountain Camp.

To give an idea of the amount of energy required it may be stated that the load for cooking at this camp alone amounts to 150 kw. One large oil range has been supplanted by three 22-kw. Hughes hotel-type electric ranges. The electricity is turned on in these ranges at full

Two of the Three Hughes Electric Ranges Used in Preparation of Food for 1,000 Camp Curry Guests.



Hughes No. 300 Electric Bake Oven—All the Bread Required by Guests at Camp Curry.



One of the Hughes Electric Ranges and a Hughes Electric Griddle Installed at Camp Curry, Calif.

heat for 40 minutes in the morning, then turned down to medium, establishing an even temperature. There is installed in the kitchen a three-rack, hotel-type toaster capable of turning out a large amount of toast at one time, thus proving a great convenience at this camp.

In addition to the ranges and toaster there has been installed a Hughes No. 300, 25-kw. bake oven which meets the demands of 1000 to 1500 people per meal. This electric oven has replaced an old brick oven in which wood was used as fuel and which took 24 hours to heat to 400 deg. With the new oven the switches are all turned to high and in four hours a temperature of 550 deg. is obtained. In connection with the bake oven there has been installed an electric dough mixer which greatly lessens the labor of baking.

Electric Ice Plant and Ice-Cream Freezer Supply Delicacies.

All dishes and silverware are cleaned and sterilized by three Peerless electric dishwashers. Another great convenience in the camp kitchen is a six-compartment Duparquet electric egg cooker which takes care of hundreds of eggs required by the guests in the course of a day. For the purpose of supplying coffee to 300 employes of the camp there is a Duparquet 6-kw. coffee percolator which completes percolation in 40 minutes.

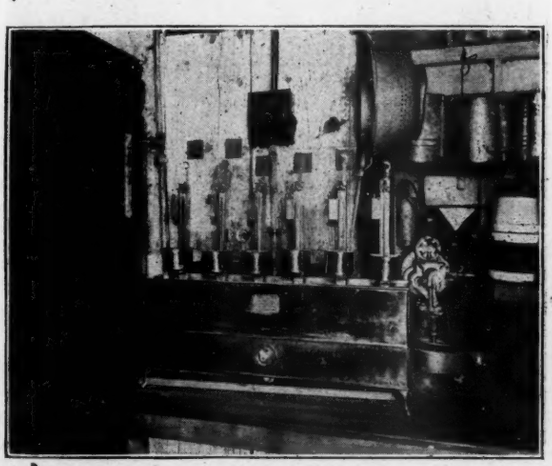
The laundry which takes care of the entire camp, including the personal laundry of the campers, is electrically equipped with 16 ironers, and also an electric shaping machine for collars.

Included in the equipment of Camp Curry are conveniences for supplying the guests with such delicacies as are usually to be found only in cities. As a foundation for such luxuries the camp maintains an electrically operated ice plant of two-ton capacity, driven by a 20-hp., three-phase, 220-volt General Electric motor. In addition there has been installed a Miller ice-cream freezer which freezes ten gallons of ice cream in 15 minutes. The camp consumes an average of 75 gallons of ice cream per day.

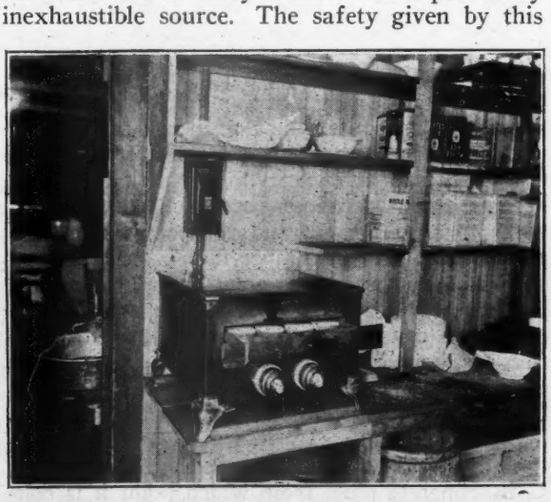
Since the camp requires much lumber for the construction of additional bungalows and other new buildings it maintains its own saw mill for turning out finished lumber. This is operated by a 20-hp., three-phase, 220-volt General Electric motor.

Electrical Equipment in Bungalows and Tents.

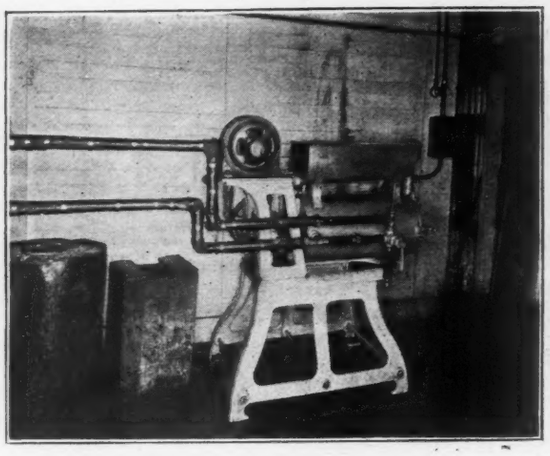
Safety and protection from fire is at its highest efficiency in Camp Curry. There is a fire-alarm system which extends to all parts of the camp, employes are well drilled for fighting fire and the water mains carry water from a practically inexhaustible source. The safety given by this



Duparquet Six-Compartment Electric Egg Cooker at Camp Curry—Electric Potato Masher at Right.



Hughes Hotel-Type Electric Toaster With Three Racks to Meet Demands of Hungry Campers.



Miller Electric Ice Cream Freezer, Brine-Cooled, Makes 75 Gallons Daily for Camp Curry.

One of the Square D Switchboards of Camp Curry Electrical Installation.

system will be better understood when it is pointed out that the occupants of the camp are in a state of relaxation. They find occasion to use matches while smoking—always a source of danger despite the utmost precaution. With a fire-fighting system as complete as that at Camp Curry, there is never a cause for fear from that source.

At the present time there are 30 rustic bungalows, each equipped with an electric water heater, 3000 watts, 220 volts, connected with a 30-gallon tank. When the water in the tank is heated to 160 deg. F., the electricity is automatically turned off until the temperature falls below that point.

The bungalows each have two rooms and, in the spring and fall, are heated very satisfactorily with a 1000-watt air heater. All electrical equipment in the bungalows is for 220 volts and the total load for the entire number is 120 kw. There are in addition to the bungalows 60 tents which are lighted and heated, and the total load for which is about 100 kw.

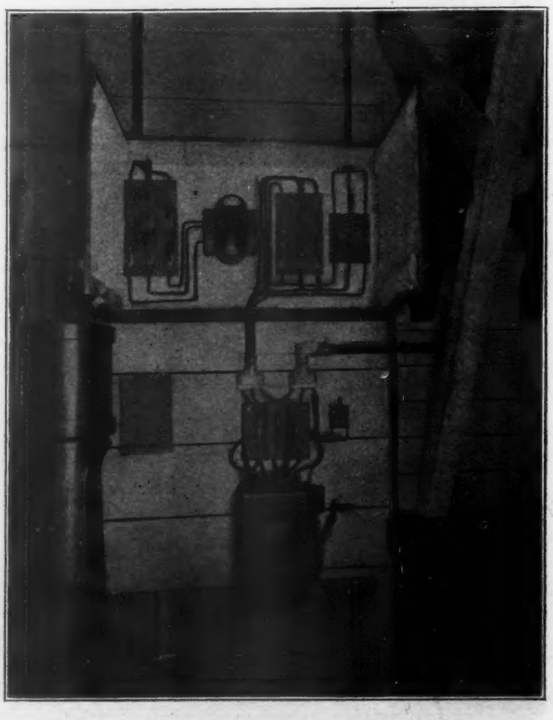
This general electrification of Camp Curry is made possible because of the small cost of electricity, the rates for which are $0.06 per kw-hr. for lighting, $0.04 for power and $0.008 for cooking.

Government Water-Power Project Is Source of Supply.

Without the government power plant, which was recently completed at a point about six miles below the Yosemite valley proper, Camp Curry would still be without its many luxuries. This new plant has a capacity of 2000 kw. with a present output of about 1000 kw., entirely adequate to meet present and prospective demands of the valley. The timber-faced, log-crib dam of the project is located about a mile below the Pohano bridge. At this point the construction contains a concrete diverting chamber with grizzles, wasteway and intake. The iron sluice gates are operated by geared mechanism located on top of the concrete structure which incloses the intake.

The water is carried beneath the highway in a 54-in. concrete pipe, from which point it is conveyed by a wood-stave pipe about 5300 ft. long, running partly on a bench along the side of the mountain and partly on trestles, to the steel penstock. A 42-in. steel pipe, 800 ft. in length, carries the water down to the level of the power house where it is delivered under a 336-ft. head. The pipe is good for 93 sec. ft., but under the present conditions, for the generation of 1000 kw., only half of the amount is utilized. The power is furnished by two 250-kv-a., 2300-volt, 30-cycle General Electric generators running at 720 r.p.m. and direct-connected to two 1500-hp. Pelton-Francis turbines. The exciters are direct connected and are rated at 10 kw. and 125 volts. Three 400-kv-a., oil-cooled transformers step the voltage up to 11,000 for transmission over a distance of eight miles to the valley.

The power plant is of all-concrete construction and cost $225,000. It was dedicated in June, 1918. The approach to the plant is over the main El Portal highway.



Another Square D Switchboard of the Camp Curry Elecerical Installation.

Advertising Essential to Success in Retailing Appliances*

Electrical Dealers Advised to Study Department Store Methods—Preparation of Advertising Copy for Newspapers—What Memphis Dealers Are Doing to Acquire Success in Co-operative Campaign

By ED. S. DUNHAM

Member Lake & Dunham Advertising Agency, Memphis, Tenn.

First, let us consider the retail selling of merchandise—general merchandise. We will single out the department stores because they represent the best practice in retailing and because they are going to be the biggest competitors of electrical dealers. There are 3800 department stores in this country. They do a business amounting to a billion dollars a year.

How do they do it successfully? Can they buy so much cheaper than you? No. Is their overhead so much lower than yours? Evidently not. The secret of their business is in volume, in quick turnovers, in proper merchandising and through advertising. All four of these items are inter-related. Proper merchandising means buying and offering goods that the customer wants.

Now, the department store gets 90% of its business from women. The merchandise manager is always looking for something he can sell. He is offered some electric irons, buys them and holds a sale in his housewares department. It goes well, so he buys a few more for regular stock and hunts up some electric fans for a sale and they in turn do well; so he takes a flier in chafing dishes and curling irons. Pretty soon he has a small stock of miscellaneous electrical goods which are segregated, and a new department is formed.

The department store, however, does not touch goods that sell slowly. It does not want the fixture business because that entails the employment of a man to install them. True, they sell window draperies which they install, but that is explained by the fact that they have to do so. Their customers demand that they handle draperies.

The point is that the department store wants just as much of the electrical appliance business as is profitable to them; the part that can be handled without increasing the overhead expense to any appreciable degree. The department store is getting this business from the electrical store for some one or more of the following reasons:

1.—The electrical appliance is in its infancy.
2.—The electrical store is not inviting.
3.—The electrical store is not well located.
4.—The electrical store does not advertise.

Item 1 is a known truth and needs no discussion; items 2 and 3 apply generally. In other words, the average electrical store is partly a shop, with men in shirt sleeves; and the average electrical store is not in the woman's path. Other specialty stores seeking women's trade locate themselves near or between department stores.

Item 4 is what concerns us. In a vague way the woman knows that there are factories that make electrical goods. She might name some of them or else she might acknowledge having heard of General Electric, Westinghouse, Robbins & Myers, Western Electric and others, but she has no particular interest in them. You will remind me now that these great concerns have spent millions of dollars for advertising and you will ask me where the results are. Let me say in reply that the woman customer has not bought enough electrical goods as yet to realize that there can be a difference in grade. She has absorbed the advertising and wants an electric flatiron, cleaner, washer, but is not concerned as to the maker. The recommendation of her favorite store is her guide and the very fact that a reliable store offers to sell her an electric cleaner is enough for her.

Studying Women's Trading Habits.

The woman customer, like men, is a creature of habit. She has her favorite store for everything that she buys frequently. Let us cite the case of a department store that studied its trade. First they put out clockers to count the customers that came from north-bound and south-bound cars; next those on foot. Then they followed customers through the store and out again—actually followed them to other stores, and learned that some customers bought hosiery one place and gloves at another; that they came in and made a bee line for the housewares department, for instance, and didn't see another thing. The owners began to shift locations of departments and to sell more goods.

Now here is where item 4 comes in. You will recall that item 4 makes the statement that electrical stores do not advertise. This means the average electrical store. The average electrical store runs "announcements" in the paper. An announcement is not necessarily an advertisement. Women read advertisements—if they contain news of merchandise. News to them means information as to *use* and *price*. They want specific information as to the convenience and comfort or labor-saving points and they want to know "how much?" Contrary to general ideas they buy more goods at regular prices than at cut prices.

But electrical dealers are handicapped. They cannot afford a full-page advertisement every

*Proceedings convention of Tennessee Contractors and Dealers, Nashville, Sept. 4.

day or every week. Still they must get attention. To get that they do not have to use a page or a half page, although they will find a little advertisement almost worthless unless designed as a reminder. Save up space and use it in sizes large enough to command attention; say three columns by eight inches and up. Then write the advertisement to sell goods. Use an illustration of the goods; not an illustration of a small boy ringing a bell and crying "Hear Ye." If you want to sell an electric cleaner, put a picture of it in the advertisement and start right out by saying, "This cleaner does this, etc.," or "This Western Electric Cleaner will do this, etc." State the price, or at least the approximate price. If it be a small article like a night lamp, display the price boldly; if a larger device—a washing machine, for instance—let the price come in small type as a part of the text matter. But display the terms of payment if offered on the dividend payment plan.

Making a Start in Advertising.

Take advantage of the ready-written advertisements that the manufacturers offer, provided they are adapted to your locality. It is unfortunate, however, that some manufacturers for the most part located in the North, direct such advertising wholly to northern people. Down here few white women do their own washing. Up North many do. Electrical washing machines have sold in large numbers in the South this year because so many "wash ladies" failed to live up to promises. Usually the advertisements provided by the manufacturers can be changed to meet local conditions and thereby produce results unless the conditions are wrong.

Using Window and Store as Advertisement.

Advertising creates the desire to have certain electrical goods and directs the prospective owner where to buy them. Since the electrical store is to a large extent a foreign country to most women, it should be the proprietors' ambition to attract these customers as frequently as possible. Therefore the selling of fans and cleaners on time payments will serve the double duty of making profits and regular customers at one time. In the store, use the counter displays furnished by manufacturers of specialties. Change the windows frequently; you can't do it too often. Since most of the goods you sell are used in the home, work out some home-like effects, and—this is important—don't try to show too many things at once. One floor lamp is better than two—and put a price tag on it. Borrow a talking machine from another store, borrow a small rug and an easy chair elsewhere; then, on a small card say, "Victrola loaned us by Houck's," "Rug and chair loaned us by Jennings."

Keep in mind that the show window is your best advertising medium. If you don't believe this, compare the rentals of stores on various streets. Rental values are based upon the number of people passing. By the same token a store on the second floor is a poor location. Cost of doing business at retail in this or any other city rises if all stores are on one street, because foot traffic centers them in a few blocks. The best way to reduce rents is by re-routing street cars and thereby squaring up the foot traffic. Banks and motion picture houses also pre-empt best corners and locations.

Preparation of Newspaper Advertising.

Your next best advertising medium is the newspaper. It is the only medium your customer pays out money to read. It is read by the whole family and its contents discussed. It permits the use of illustrations and takes your message everywhere. Use it liberally and frequently but don't run an advertisement in it just because you feel you should. Rather than fill the space with just anything omit the advertisement. On the other hand, it isn't hard to prepare a selling advertisement if you will only stick to the facts and remember that the headline should tell the story. Study the front page of any newspaper and you will find that the important fact is told in the headlines, the most important details in the subhead, the gist of the whole story in the first paragraph and then, if the item be truly important, the whole thing is retold point by point in the succeeding paragraphs.

Frequently advertisers raise the objection of repetition. Repetition is a necessary quality of a good advertisement. It is emphasis. In personally selling over the counter one can emphasize important points by modulation of the voice and by repetition. One can modulate the voice of an advertisement by means of varying the type size. A peculiarity of it is that emphasis can be attained by dropping a paragraph into a type smaller than the size of the body matter and setting it in a narrower measure. Italic type also contrasts and can be used for emphasis.

Brevity, however, is greatly desired in all except mail order and institutional advertising. But brevity must not be made a religion; the story must be told, or else you get back to the "announcement" class again. The mere statement that next week you will present a special display of fixtures is not nearly so good as to say that "this display will contain living room fixtures at $15, $20, $25 to $150, dining room fixtures at $20, $25 to $125," and so on. Give the prospect something to hang his hat on. Probably it should be her hat because, with the exception of new houses built for sale, a woman is back of the order for new fixtures. And if you are offering a reduced price of say 20% off, say so, and then list some of the prices, such as "$50 fixtures in this sale $40, $35 fixtures $28," and so on. Twenty per cent off means something to you, but many women cannot figure it—they are not used to trade discounts.

Originality and Simplicity Desirable in Advertising.

Seek originality, but don't get the idea that originality is to be had in the actual set-up of the advertisement. In that respect there is nothing new under the sun. By originality is meant something new. For instance, in Memphis, we see upon buildings in process of erection, signs —some of them lighted—"Electric Work by Fowler." Then in the newspapers almost every day a two-inch advertisement which simply reads "Electric Work by Fowler." A few of those signs multiply themselves in the public

mind to the point where many people think Joe Fowler has the town "sewed up tight." Then, too, they see the little advertisement in the paper possibly three times a week and think it's there every day. This is called "reminder" advertising and builds prestige because it stimulates in the public mind the fact that Fowler Electric Co. does a large contracting business.

When it comes to the actual lay-out or design of the advertisement, seek simplicity. Many have been heard to say, "Leave it to the printer." An advertising agency never leaves it to the printer. As a rule the printer prefers capital letters and sticks an ornament into every vacant corner. Simplicity is accomplished by using plenty of white margin and reasonable size type. Avoid capital letters if you can; capitals are hard to read; the eye is not accustomed to them. Avoid long lines of small type. Newspapers use 6-point ordinarily for their news matter. It is set two inches wide. The eye is trained to it, but if the same type were set two columns wide you couldn't read it. Therefore, if your type matter crosses two columns, enlarge the type.

As to borders; bear in mind that the reader buys the paper to read the news, not the advertisements. If you use a heavy black border for a small advertisement you cut yourself off from the news matter. The reader unconsciously stops when he comes to it. Black borders are usable around very large advertisements because such advertisements dominate the page—are seen before the news—which justifies the use of a large advertisement.

The nature of the electrical business is such that it must be advertised if the possibilities of the fixture and appliance business are to be reached. Probably the first electrical goods sold in quantity were flatirons, but less than half the families in this city have them. You can't name one comfort or labor-saving device but that every woman will say she intends to have one. If milliners were to quit advertising they'd soon go out of business. We all got along without victrolas very nicely ten years ago. Somebody must make people want electrical goods or else they will never buy them. The manufacturers do their part, and are doing it so well that people are buying them of those stores that bid for their business.

Co-operative Advertising as Done in Memphis.

Every time the Jones Electric Shop advertises electric washers it makes it easier for Brown Electric Co. to sell them too. When Brown advertises fixtures he helps make sales for Jones. There's so great a volume that can be created that every electrical store can afford to help make the demand. Then why not all join together and do some co-operative advertising?

It has been my good fortune to prepare such a campaign for the Memphis Electric League. The object of the campaign is two-fold—that of creating the desire for electrical conveniences, comforts and labor-saving devices, and that of promulgating the truth that it is always best to buy electrical goods at electrical stores. Each advertisement is 50 to 75 ins. in size and contains "reason-why" copy. It also contains the names of the contributors. No trade-marks are mentioned. We say instead, "there are several fans of standard manufacture which electrical stores feel worthy of their personal guarantee," or, "the electrical store avoids goods obviously made to sell." The latter is a point especially emphasized. We stress the fact that when devices become broken the first thought and act is to take them to an electrical store. "Then why not avoid possibility of inferior goods by purchasing standard goods at a store that can furnish renewal parts and make repairs upon short notice."

We state that the electrical store deals only in standard electrical merchandise and materials. Further, that the proprietor himself generally knows each transaction and becomes acquainted with his customers personally, that he knows full well his customers expect him to protect them from inferior goods, and that his business career is built upon that confidence. These advertisements are unsigned; that is, they do not contain the name "Memphis Electric League." They carry "19 Good Reasons Why You Should Buy Electrical Goods at Electrical Stores." The reasons are simply the names and addresses of the 19 retailers and contractors responsible for the advertisement.

Just one more point. If I were in the electrical business I'd be a member of the Society for Electrical Development. This organization provides central stations, contractors and dealers with a most wonderful service in the way of a monthly bulletin of ideas in sales service. Most of you are probably members. Advertising is only one of the subjects covered.

Finally, advertising is like electricity. It furnishes tremendous power. None of us can describe the power exactly. We only know it is there. We know how to generate it and should know how to use it. But, just like electricity, if you don't know how to use it, be careful. It pays to be right.

AMERICAN INGENUITY WINNING INDIAN MARKETS.

"The real reason why American manufacturers are making progress among the importers of India is our adaptability to native conditions," said William F. Bancker, general purchasing agent of the Western Electric Co., who recently returned from an investigation trip of foreign markets. "When I was in India I noticed the farmers using agricultural instruments peculiar in appearance but made by American steel foundries. It has been known for years that the average Asiatic cannot easily be converted to western methods. As a result when foreign concerns tried to introduce their modern farming tools they faced a hopeless task, the natives sticking to the old wooden plows and other crude appliances which had been used by their forefathers. But when the American agents found these conditions, instead of being discouraged, they procured samples of the various old-fashioned wooden tools and surprised the Indian market by reproducing them in steel. As a result American farm tools are gaining in favor with Indian consumers."

Westinghouse Interests Arrange Merchandising Shows

Better Selling Methods and Application of Systematic Business Principles to Even the Smallest Stores Will Be Illustrated in Various Sections for Electrical Contractor-Dealers and Jobbers

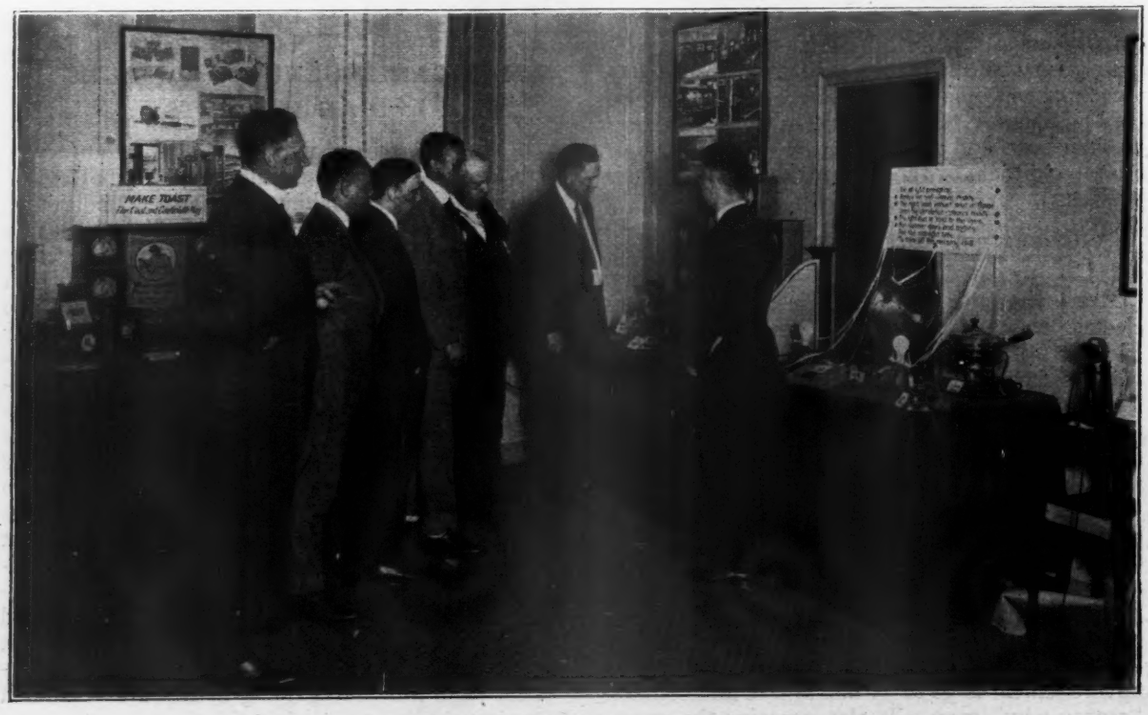
Plans for improving the sales possibilities of retail merchants of electrical supplies have been devised by the Westinghouse Electric & Manufacturing Co. and the Westinghouse Lamp Co., and are being placed in operation. The plans enable the manufacturers of electrical equipment and the jobbers to co-operate for the purpose of revealing to the dealer new opportunities for making sales, improved methods of stock keeping and display, methods of treating customers that will cause them to come again, scientific methods of accounting, proper methods of advertising and many other facts about a retail establishment that a successful dealer must know. All of this is to be accomplished by means of demonstrations held in various localities and are referred to as "Westinghouse Better Merchandising Shows." The plans have been adopted as a means of reducing the large business mortality rate among dealers and, in addition, of creating a larger demand for electrical supplies.

The shows, which will continue usually during two-day intervals, will be scheduled in centers from 50 to 100 miles apart. They will consist of actual displays, usually in hotels to which interested persons will be invited. The displays are made up of exhibits of apparatus, charts, photographs and window lighting and trimming. Photographs will illustrate proper and improper methods of store display and the charts will contain data on advertising, selling, accounting, bookkeeping and other functions of a successful retail merchant. Each panel and display group will be the subject of a lecture by Westinghouse experts.

Electrical Jobbers to Participate in Instruction First.

In order that the dealers may get the most benefit from the shows, the jobbers in the different centers will also see them. The plans contemplate exhibiting to the jobbers and their salesmen in a district first, and then while the display is assembled, showing to the dealers in the district. By adopting this schedule, the jobbers can assist in driving home to the dealers the advantages of applying systematic business principles to even the smallest business.

The show, in part, consists of a series of 20 wall panels illustrating in concrete form by means of photographs, diagrams, extracts from advertising material, etc., the various features of correct merchandising practice. Around these display panels a definite talk on modern merchandising will be given for the benefit of the jobbers' salesman. There are also two simulated show windows which demonstrate effec-



Demonstration of Counter Displays in Westinghouse "Better Merchandising Shows."

Arrangement of Window Displays in Westinghouse " Better Merchandising Shows."

tively the possibilities of window illumination and effective window trimming. Use is made of these windows to show how simply stock material can be adapted to window display, and an actual demonstration of window trimming will be conducted, illustrating how lamps, heating appliances, fans, vacuum cleaners, washing machines, vibrators, etc., can be effectively displayed. The reason for the presentation of the show to the jobbers' salesmen in conjunction with the talks by factory experts is to familiarize them with its objects and its operations so that, at the subsequent presentations to the dealers, they will be competent to give material assistance.

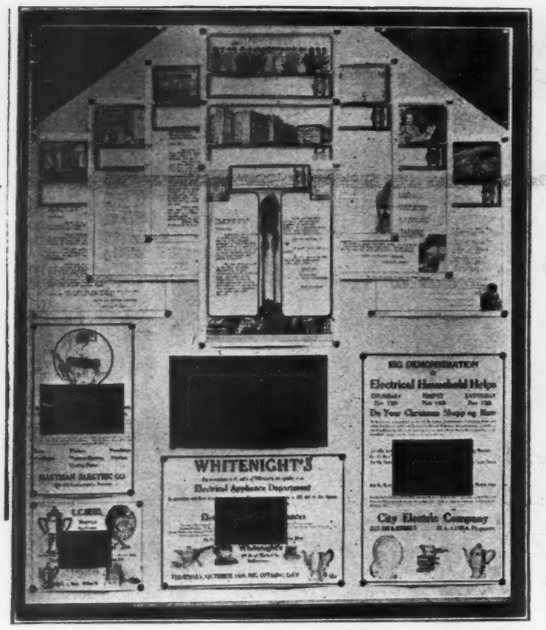
Merchandising Features Intended to Benefit Contractor-Dealers.

Following the presentation of the "Better Merchandising Show" to the jobbers, the show will be operated for the benefit of the retail trade. A series of circular letters of invitation will have been sent to a comprehensive mailing list covering contractor-dealers, electrical appliance dealers and all who might be interested in the distribution of electrical appliances, including lamps. This series of letters will be sent out according to a definite mailing schedule so that each prospective visitor to the show will receive in turn letters from the lamp manufacturer, appliance manufacturer and the jobber—five in all—followed by a reminder postcard arriving in his establishment on the day preceding the exhibition.

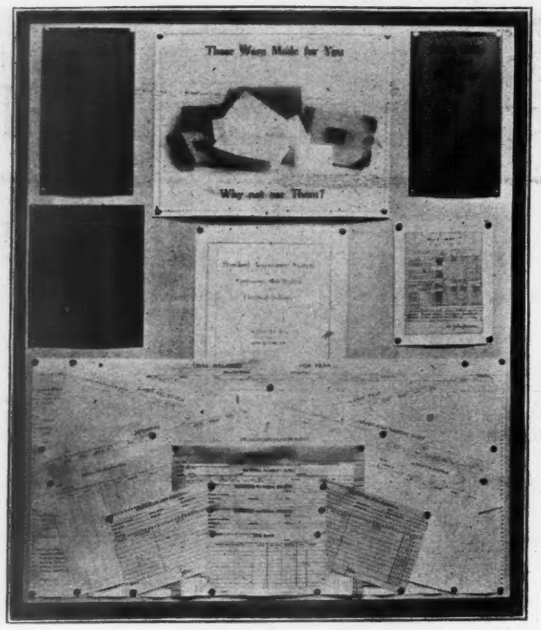
Dealers who will attend the dealers' show as a result of this active circularization will arrive on the scheduled date at the hotel where the show has been set up, and which will be located at a point logically accessible to the dealers invited for that particular presentation. They will be received by a representative of the lamp manufacturer, appliance manufacturer and the jobber, who will demonstrate to them the best in merchandising ideas in much the same way as it was presented previously to the jobbers' own personnel.

View in Westinghouse "Better Merchandising Shows," Disclosing Panels and Counter Displays.

Another View of Panels and Counter Displays in Westinghouse "Better Merchandising Shows."



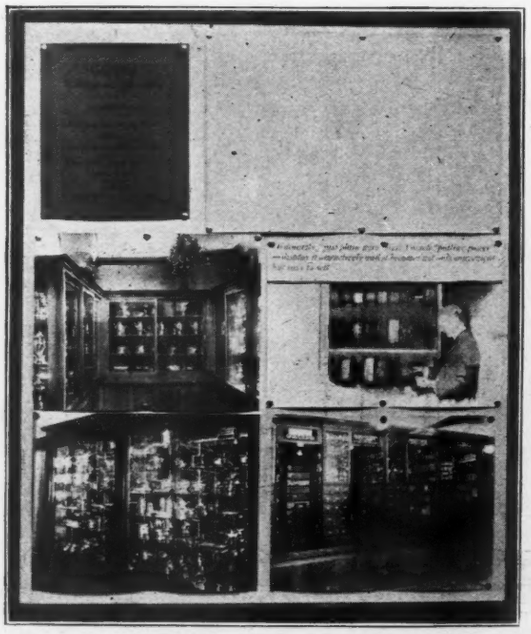
Helps in Dealers' Local Campaigns.



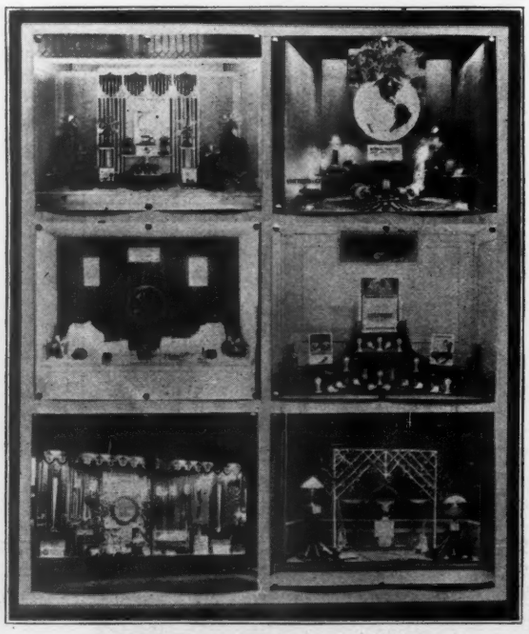
System for Store Accounting.

The dealer will be shown what the possibilities are in merchandising and the sources from which come the amount of future business predicted. All this will be explained. He will be given an adequate conception of his possibilities for future growth as a merchandiser and will be shown the series of panels which will indicate how he may profit by this huge business field outlined previously. He will be shown the simulated show windows and shown by actual demonstration the effects of effective and improper illumination on window trims. He will be shown how easy and simple it is to decorate effectively a window with the material that he has on hand at a minimum of expense of time and labor. He will be shown how to arrange counter displays and how to make demonstrations. He will be initiated in the processes of manufacture of lamps and appliances and will be given a very complete and comprehensive idea of the methods which have made successful merchandisers out of many dealers who started as electrical contractors.

Only the representatives of the Westinghouse companies and jobbers will attend the preliminary demonstrations. But any who are interested in better electrical retail management are invited to attend the demonstrations held subsequently. A pamphlet describing the methods of better merchandising being demonstrated, as well as a number of other methods, is presented to those who are interested. The first demonstration was given to representatives of technical papers at the Hotel Pennsylvania in New York City.



Dressing of Wall Cases and Shelf Displays.



Lessons in Window Trimming.

Stator Windings and Connections for Two-Phase Motors

Methods Used in Determining Coil Pitch in Half-Coil and Whole-Coil Windings — Rules for Connecting Coils in Groups and Assembling Groups in Phases — Three-Wire and Four-Wire Circuits

By JACOB GINTZ

All polyphase induction motors are self starting. Any one phase or winding in a polyphase machine has the same characteristic as a single-phase winding. By keeping this fact in mind it will be readily understood that the placing of a number of single-phase windings on a stator—windings which are displaced by the same angle as are the applied electromotive forces—will eventuate in a polyphase winding. In this article the stator windings for two-phase induction motors with squirrel-cage rotors will be taken up.

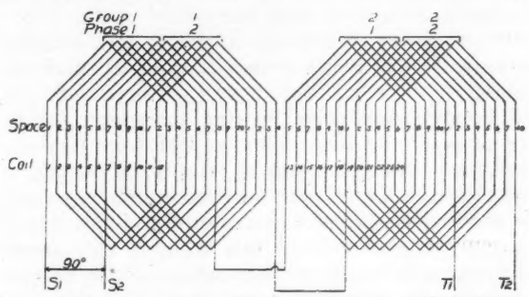


Fig. 1.—Diagram of Four-Pole, Two-Phase, Half-Coil Induction-Motor Winding.

Stator windings are divided into two classes as half-coil and whole-coil windings, and the following rules should be kept in mind when tracing the connections in the accompanying winding diagrams.

Rule for half-coil windings.—When connecting a number of coils to form a group, connect the end of the first coil to the beginning of the second coil; follow this method until the group is completed. When connecting a number of groups to form a phase, connect the end of the first group to the beginning of the second group belonging to the same phase; follow this method until each phase is completed.

Rule for whole-coil windings.—The connections for coils forming a group are made the same as in half-coil windings. But when connecting up the groups to form a phase, connect the end of the last group to the end of the second group belonging to the same phase, and connect the beginning of the second group to the beginning of the third group belonging to the same phase, etc., until all connections are completed.

Two-Phase Windings of the Half-Coil Type.

The winding diagram shown in Fig. 1 is that of a two-phase, four-pole, half-coil winding having 24 coils placed two coils per slot. A two-phase winding has the same characteristics as two single-phase windings placed in the same stator or field of an induction motor, or in the armature of an alternator, except that they are displaced by the same angle as the applied voltage; that is, they are 90 electrical degrees apart.

Following are the symbols and their meanings as used in the various formulas for finding the coil pitch and the number of coils per group: C = number of coils used in winding; P = number of poles; Ph = number of phases, and 2 = a constant.

TABLE SHOWING LOCATION OF COILS IN SLOTS AND SPACES FOR HALF-COIL WINDING.

Coil number.	In winding spaces.	In slots.
1.....	1 and 13	1 and 13
2.....	2 and 14	2 and 14
3.....	3 and 15	3 and 15
4	4 and 16	4 and 16
5.....	5 and 17	5 and 17
6.....	6 and 18	6 and 18
7.....	7 and 19	7 and 19
8..... ..	8 and 20	8 and 20
9.....	9 and 21	9 and 21
10.....	10 and 22	10 and 22
11.....	11 and 23	11 and 23
12.....	12 and 24	12 and 24
13.....	25 and 37	25 and 37
14.....	26 and 38	26 and 38
15.....	27 and 39	27 and 39
16.....	28 and 40	28 and 40
17.....	29 and 41	29 and 41
18.....	30 and 42	30 and 42
19.....	31 and 43	31 and 43
20..	32 and 44	32 and 44
21.....	33 and 45	33 and 45
22.....	34 and 46	34 and 46
23.....	35 and 47	35 and 47
24.....	36 and 48	36 and 48

The coil pitch as used in Fig. 1 is found as follows:

Coil pitch = $(C \times 2)/(P = (24 \times 2)/(4 = 12)$.

It must be borne in mind that the coil pitch for a half-coil winding can result in either an odd

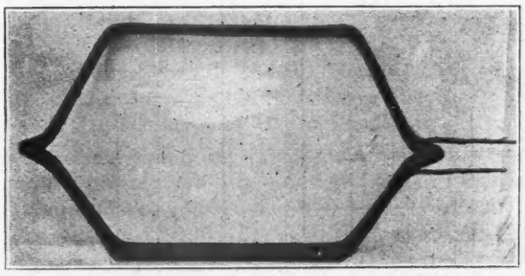


Fig. 2.—Typical Coil for Induction-Motor Stator.

or an even number, and that the number of coils used in the winding must fulfill two conditions; that is, the number of poles and the number of poles times the number of phases must be multiples of the number of coils used. These condi-

tions are fulfilled in the above winding, and the placing of coils will be as indicated in the accompanying table. Fig. 2 shows a typical diamond-shaped coil as used in stator and armature winding by the Westinghouse Electric & Manufacturing Co.

After all coils have been placed they are then divided into groups, all coils belonging to the same group being connected in series. The number of groups composing a phase will be equal to the number of pairs of poles. As this is a four-pole machine, there will be two groups of coils per phase. The following formula is used to find the number of coils per group: Coils per group $= (C \times 2)/(P \times Ph) = (24 \times 2)/(4 \times 2) = 6$.

By examining the diagram, Fig. 1, it will be seen that the coils numbered 1 to 6, 7 to 12, 13 to 18, and 19 to 24, form the four groups (two groups per phase). The connections between the coils forming a group are made according to the rule given above. The two phases, or windings, in a two-phase machine are displaced by 90 electrical degrees, and for this reason the groups whose terminals are displaced by 90 electrical degrees will belong to phases one and two respectively.

Connection of Groups of Coils to Form Phases.

From Fig. 1 it will be seen that groups No. 1 and 3 form the first phase, groups No. 2 and 4 form the second phase, and the connections are made as stated in the rule for half-coil windings. The terminals marked *S1, S2, T1* and *T2* are the beginnings, *S*, and the ends, *T*, of the phases. Numerals indicate the number of the phase to which the terminals belong. A two-phase circuit can be either a three-wire or a four-wire circuit. If the winding in Fig. 1 is to be connected to a four-wire circuit, the four terminals *S1, S2, T1* and *T2* would be used as they are; but if they are to be connected to a three-wire circuit, *S2* and *T1* would both be connected to the center wire of the line. Fig. 3 illustrates the three-wire and four-wire two-phase circuits.

Whole-Coil Winding for Induction Motors.

Fig. 4 shows the winding diagram of a four-pole, two-phase, whole-coil winding for either the field of an induction motor or the armature

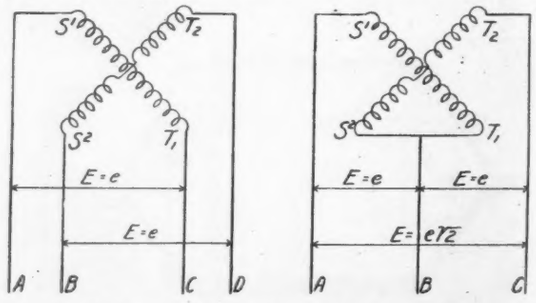


Fig. 3.—Method of Connecting Two-Phase Motor for Three-Wire and Four-Wire Circuits.

of a generator. By comparing the diagrams, Figs. 1 and 4, it will be seen that the coils are placed somewhat differently, but the principles applied to both windings are practically the same. In Fig. 1 there is one coil per slot while in Fig. 4 there are two coils per slot. It may be noticed that all of the odd-numbered winding spaces represent the beginning of the coils, and the even-numbered winding spaces represent the ends of the coils. Both illustrations represent four-pole windings. In Fig. 1 there are two groups of coils per phase, while in Fig. 4 there

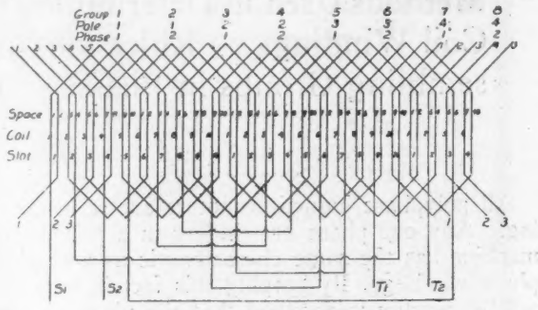


Fig. 4.—Diagram of Four-Pole, Two-Phase, Whole-Coil Induction-Motor Winding.

are four groups of coils per phase. The following rule may help in determining half-coil and whole-coil windings:

Rule.—In the half-coil winding there will be as many groups of coil per phase as there are pairs of poles, while in a whole-coil winding there will be as many groups of coils as there are poles.

The spread of a coil in Fig. 4, in which there are 24 coils and four poles, will be found as follows: Winding spaces $= (C \times 2)/P = (24 \times 2)/4 = 12$. This being an even number it must be made odd by adding or subtracting 1; then $12 \mp 1 = 13$ or 11. In this winding the spread of a coil will be 11 winding spaces. The accompanying table gives the number of the coils, the winding spaces and slot numbers in which they are placed.

TABLE SHOWING LOCATION OF COILS IN SLOTS AND SPACES FOR WHOLE-COIL WINDING.

Coil number.	In winding spaces.	In slots.
1	1 and 12	1 and 6
2	3 and 14	2 and 7
3	5 and 16	3 and 8
4	7 and 18	4 and 9
5	9 and 20	5 and 10
6	11 and 22	6 and 11
7	13 and 24	7 and 12
8	15 and 26	8 and 13
9	17 and 28	9 and 14
10	19 and 30	10 and 15
11	21 and 32	11 and 16
12	23 and 34	12 and 17
13	25 and 36	13 and 18
14	27 and 38	14 and 19
15	29 and 40	15 and 20
16	31 and 42	16 and 21
17	33 and 44	17 and 22
18	35 and 46	18 and 23
19	37 and 48	19 and 24
20	39 and 2	20 and 1
21	41 and 4	21 and 2
22	43 and 6	22 and 3
23	45 and 8	23 and 4
24	47 and 10	24 and 5

When all coils have been placed they are then divided into groups, and all coils belonging to the same group are connected in series according to the rule governing whole-coil windings. To find the number of coils per group use the following formula: Coils per group $= (C \times 2)/(P \times Ph \times 2) = (24 \times 2)/(4 \times 2 \times 2) = 3$. Then group No. 1 consists of coils 1, 2 and 3; group No. 2 consists of coils 4, 5 and 6; group No. 3 consists of coils 7, 8 and 9; group No. 4 consists

of coils 10, 11 and 12; group No. 5 consists of coils 13, 14 and 15; group No. 6 consists of coils 16, 17 and 18; group No. 7 consists of coils 19, 20 and 21, and group No. 8 consists of coils 22, 23 and 24.

The next step is to determine which groups belong to the same phase. As previously ex-

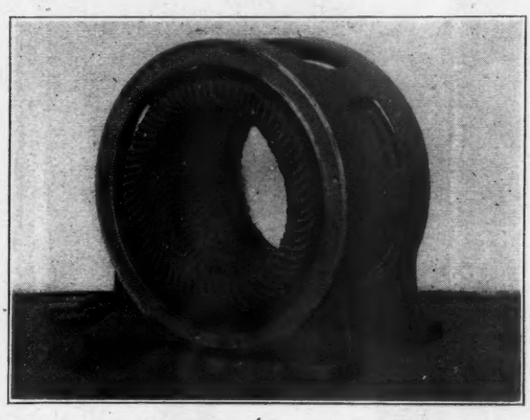


Fig. 5.—Induction-Motor Stator With Coils in Place.

plained, the phase displaeement in a two-phase machine is 90 electrical degrees. A simple rule for finding how many coil sides must be advanced from any point to equal 90 electrical degrees is as follows:

Rule.—Each pole in any machine is equal to 180 electrical degrees; then in a four-pole field there will be 4 times 180, or 720, electrical degrees. In case of Fig. 4 there are 24 times 2 equals 48 coil sides, and to find the number of coil sides that will be equal to 90 electrical degrees the following formula may be used: Coil sides for 90 electrical degrees = Coil sides/$(P \times 2) = 48/(4 \times 2) = 6$.

Then by assuming that coil side No. 1, which is in winding space No. 1, is the beginning of phase No. 1, the sixth coil side from this point, or coil side No. 7, will be the beginning of phase No. 2. As shown in Fig. 4, *S1* and *S2* are the beginnings of coils No. 1 and 4 which are also the beginnings of groups No. 1 and 2. From this it will be seen that alternate groups belong to the same phase; that is, groups No. 1, 3, 5 and 7 will form phase No. 1, and groups No. 2, 4, 6 and 8 will form phase No. 2. The interconnection between the groups which form a phase are made as stated in the rule which governs whole-coil windings. The four final termi-

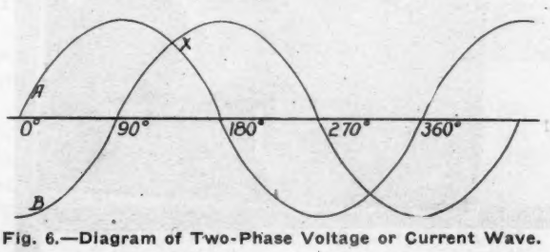


Fig. 6.—Diagram of Two-Phase Voltage or Current Wave.

nals *S1, S2, T1* and *T2* can be formed in a three-wire or a four-wire circuit as shown in Fig. 3. As shown in Fig. 3, a higher voltage is obtained between leads *A* and *C* on the two-phase three-wire circuit. This is caused by both windings being connected in series, but it should be remembered that neither winding is producing its maximum pressure, *E*, at the same time. As shown in the two-phase sine curve at point *X*, both windings are producing an average pressure, *E*, and for this reason the line pressure will be the vector sum of both which is equal to *E* times $\sqrt{2}$. This represents the pressure across the terminals *A* and *C*, while the pressure across *A* and *B*, also across *B* and *C* will be equal to the pressure per winding $(E = e)$.

JAPANESE WORKERS IN ELECTRICAL INDUSTRY.

Students of the growing American enterprises in the Far East will be interested in the statement just issued by the Nippon Electric Co. of Tokyo, the Japanese subsidiary of the Western Electric Co. of New York. Organized under American supervision less than a generation ago to manufacture the telephone and many of the other electrical requirements of Japan, the Nippon company had 1340 native employes in its personnel when its fiscal year closed recently. Of these 143 had been employed by it over ten years, 29 over 15 years, while 11 had seen over 20 years of service. Following the system used by the Western Electric Co. in America in rewarding length of service among its employes, the Nippon Electric Co. gave a dinner to its old-timers at Sanyentei. Gold buttons and certificates of service were presented to all those who had passed the ten-year mark.

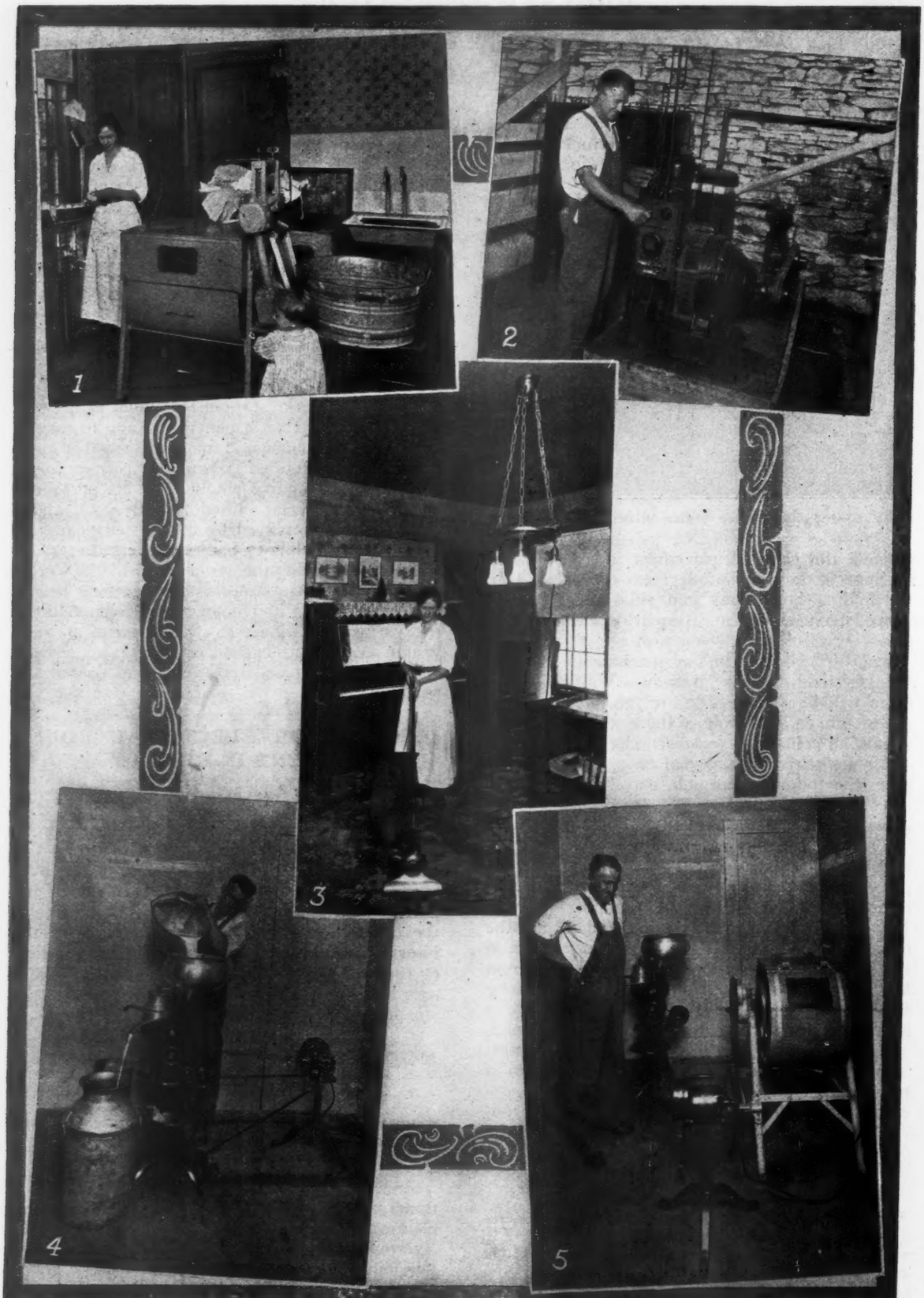
DEMAND FOR ELECTRICAL EQUIPMENT IN CHINA.

Owing to the Chinese fondness for things durable, giving good service a long time, electric-plant equipment of sterling quality, capable of withstanding untrained usage, is in strong demand now that electricity is coming into its own in China. Many orders have been given for power and lighting plant for cotton mills, and the demand for lighting plant for cities in the interior is steadily growing. Steam turbines are to the fore where large plant is concerned and are being introduced to some extent in the smaller plants, since the rise in price of crude oil.

MODEL ELECTRIC FARM FEATURED IN MOTION PICTURES.

Pennsylvania Farmer Installs Farm Lighting and Power Plant and Enjoys Some Electrical Advantages of Urban Conditions.

Like many another farmer who observes with understanding eye the advantages of modern utilities all too exclusive to city life, William E. Shetrone, Le Raysville, Pa., pondered on the possibilities of rural extension of electric transmission lines and the number of things he could make electricity do to solve the work problems for himself and wife. He early learned that electrical power development has not yet reached the stage where the majority of farmers can procure rural service at any great distance from the power plants without the rates being prohibitive. He soon learned, however, that the next best thing would be to procure a farm power and



Views Taken of Electrical Installation at Shetrone Farm

Fig. 1.—Electricity Operates Washer and Wringer, Produces Lights and Pumps Water for the Kitchen. Fig. 2.—Western Electric Power and Light Outfit. Fig. 3.—Electric Vacuum Cleaner and Lighting Fixtures. Fig. 4.—Portable Motor Driving Cream Separator. Fig. 5.—Portable Motor Operating Churn.

light outfit that he could install in his basement and produce his own electricity with the aid of a gas engine.

Thus it transpired that the humble Shetrone farm in the Pennsylvania hills has become somewhat famed in farm journals and motion pictures as the model electrical farm. This publicity was brought about chiefly through the agency of the Western Electric Co., who furnished the electrical equipment for the farm.

At about the time Mr. Shetrone began his quest for a farm power and light plant agents of the Western Electric Co. were casting about for a likely "location" for a human interest motion picture film to be known as "The Go-Getter." The cameraman photographed the farm and its surroundings and equipment in the unimproved condition for the prologue to the film story. After the electrical outfit was installed and the various labor-saving appliances were ready for operation the remainder of the story was filmed. A vein of romance was woven into the scenario to sustain interest.

In the page of scenes in and about the Shetrone farm, presented herewith, only a few of the installations are shown, including the generating outfit, electric clothes washer and wringer, taps from which running water is obtained by electrically pumping into a tank, lighting fixtures, vacuum cleaner, cream separator and churn. The "Go-Getter" film is being received with enthusiasm in rural communities all over the country.

PLANNING NEW POWER SUPPLY FOR GREAT BRITAIN.

Choice Must Be Made Between Large and Small Stations—Water Power to Be a Prominent Factor.

By Mark Merideth.

There is considerable difference of opinion among engineers as to the advantages of the very large power stations that were proposed recently by the Committee on the Conservation of Coal. The committee's idea was to establish 18 super-power stations, in different parts of the country, that would supply electric currents for light, power and other purposes in every part of Great Britain. These large power stations were to be worked by steam, and the point was at once made by critics that the water power of the kingdom had been overlooked. Since then, another committee has examined the question of water power within the United Kingdom, in India, the Dominions and elsewhere, and it is understood that water power will be used where it is possible in any scheme for supplying power cheaply.

Another and very serious objection that has been raised to the first committee's scheme is the fact that the super-power stations would be known to an enemy in case of war and would be open to attack from the air; and it would again be the case of having all one's eggs in one basket.

The question has also arisen, not for the first time, as to whether large power stations are really more economical than moderate-sized ones. The problem involved is similar to that which every manufacturer using machinery has to face. With every machine each addition to its output that can be made and sold lessens the cost of the individual articles produced, up to the safe capacity of the machine. If the demands exceeds this amount, and another machine has to be put up to meet it, the cost of the individual articles produced is increased by the standing charges on the second machine. If the demand goes on increasing the cost will be again reduced until a third machine is demanded, and so on.

Large power stations have the advantage that their units, when laid down, are considerably larger than those of moderate sized stations, and the trouble outlined above may be met by increasing the size of the units as the output of each one is reached. But here again is the cost of the machine that is thrown out of use and which has to be taken from any profit made by the increased capacity of the larger machine.

In power stations large units or large turbo-generators take no more attention than smaller ones, and so considerable advantage should be obtained in standing charges and skilled labor costs by the use of larger and larger units. Large steam turbines also are claimed to work more economically and to use less steam and accessories than smaller turbines, and this is a further advantage. But as no engineer would care to depend for long upon a single unit, a spare unit is a necessity, and a large spare unit adds considerably to the capital charges.

In a larger power station also the accessories must be large, some of them numerous, and all of them require skilled attention.

MARINE CORPS TO VISIT NEW YORK ELECTRICAL SHOW.

Arrangements have been made for the class in electrical engineering at the Marine Corps Institute, Quantico, Va., to visit the electrical show to be held at the Grand Central Palace, October 6-16. The class, which is composed entirely of marines, many of whom saw service in France, is being sent to New York in order to study the most recent developments in the electrical field. Before visiting the show the men will inspect the Waterside power plants of the New York Edison Co.

ELECTRIC POWER OUTPUT LARGER THAN IN 1919.

For the first half of the present year the electric power generated in public-utility plants exceed that of 1919 by approximately 17%. The total output tabulated for 1919 totals 38,900,000,000 kw-hrs., 62.1% of this amount being generated by fuel-burning plants. These plants consumed 35,000,000 tons of coal, 11,050,000 bbls. of oil and 21,700,000,000 cu.-ft. of gas.

The quantities here presented are based on returns from about 3000 power plants of 100-kw. capacity, or more, engaged in public service work of various natures. The month of January shows the highest average output for the current year, the figure being 124,700,000 kw-hrs. per day. A total mean daily output of 120,000,000 kw-hrs. has been maintained for the first half of the year as compared to 102,900,000 kw-hrs. for the corresponding period of 1919.

ELECTRIC POWER USED IN THE PRODUCTION OF ZINC.

Zinc Refining More Economical in Plants of Large Capacity Having High Load-Factor and High Power Factor.

The commercial application of electrolytic precipitation of zinc from sulphate solution in the hydrometallurgy of zinc is less than five years old. The first recorded production in the United States was 10,963 tons in 1916, and in 1918 the output had increased to 38,885 tons, according to an article in a recent issue of *The Electrical News*. The electrolytic zinc production of 1918 was 7.3% of the total production of the United States. At the present time there are four commercial plants for production of electrolytic zinc in the United States and one in Canada, with a total production capacity of about 300 tons of zinc per day. One plant has been built in Australia and two in Tasmania.

The secret of successful electrolytic precipitation is to precipitate the zinc from a pure electrolyte. Sheet-lead anodes and sheet-aluminum cathodes are used. The zinc is stripped from the aluminum cathode and melted for casting into ingots. The power consumption in one plant is as low as 1.7 kw-hrs. per lb. of zinc precipitated. In others it is as high as 2.5 kw-hrs. per lb. of zinc. In one plant three-phase current is delivered at 44,000 volts, transformed to 2300 volts, and converted to 250 volt direct current by synchronous motor-generator sets. The installed transformer capacity of electrolytic-zinc plants in the United States and Canada is about 60,000 kv-a.

A 1000-kw. melting furnace of the carbon-resistor type was put in operation in 1919 for melting the zinc cathode of an electrolytic-zinc plant. In the first weeks of operation the furnace melted zinc with a power consumption of 70 to 80 kw-hrs. per ton of metal charged and a metal loss in dross of 0.024%.

Although there has been considerable experimenting in the United States and Canada during the past ten years on electric smelting of zinc ores, nothing has been done in commercial production. Electric smelting of zinc ore and dross has been practiced commercially in Sweden since 1901. Two plants are in operation in that country of a total transformer capacity of 15,000 kv-a. A large part of this capacity has been used for smelting dross. When smelting ore the main difficulty has been in production of blue powder instead of zinc. Single-phase furnaces of 350 to 750-kv-a. size are used. Although the blue powder difficulty appeared practically solved by experimenters in the United States several years ago, nothing commercial has resulted.

The use of electricity in metallurgical processes for treatment of ores is certain to increase slowly. The operation of the Anaconda plant has shown that zinc can be produced electrolytically at a profit with zinc at its normal price. Electrolytic plants will probably prove most successful in large units, and the growth will be toward a few large installations rather than many small ones. All of the plants erected to date use central-station power.

ELECTRIC PROPELLING MACHINERY OF THE FUTURE NAVY.

Great Increases in Power, Speed, Tonnage and Armament to Feature American Naval Ships Now Being Prepared.

The present naval program of the United States is the most extensive ever undertaken by any Nation. The government is now rapidly completing six battleships of the *Tennessee-New Mexico* class, and, while these vessels are today unequalled in military power, they will become secondary as soon as representatives of two new classes are put into commission.

These new classes consist of battleships and battle cruisers which will compare with the *Tennessee* as shown in the accompanying table.

The new battleships are to be electrically driven and the main propelling equipment of four of them—the *Indiana, Montana, South Dakota* and *North Carolina*—will consist of two Westington 28,000-kv-a. turbine generators and four 15,000-hp. Westinghouse propeller motors. The turbines are to be of the complete-expansion, impulse-reaction type, and will develop their full rated load at 265-lbs. steam pressure, 50-deg. superheat and a 28½-in. vacuum. Electric energy will be generated in the form of three-phase, 60-cycle, 5000-volt alternating current.

The statistics of the new battle cruisers given in the table indicate that these vessels are to be very unusual in many respects, but their most remarkable feature is the enormous power of the turbines, their capacity being 180,000 hp., or 160,000 kv-a.

These figures do not, however, give an adequate conception of the magnitude of this power. Not only is it greater than that of any ship ever designed, the power of the British cruiser *Hood* being 134,000 hp. and that of the *Leviathan* 90,000 hp., but it is greater than that used by most cities of over a half a million inhabitants. There are, in fact, but two or three steam power plants in the world that have greater capacity than the engine rooms of these battle cruisers will have, so that, from the standpoint of power engineering alone, the construction of these vessels will constitute an achievement of the highest order.

Two of these vessels, the *Ranger* and the *Constellation*, will have the following equipment: Four Westinghouse main turbines to develop 49,750 b.hp. each, with steam at 265 lbs., 50-deg. superheat and a 28½-in. vacuum; four 40,000-kv-a. Westinghouse generators, directly connected to these turbines and generating three-phase, 51.3 cycle, 5400-volt alternating current, and eight wound-rotor Westinghouse motors (two to each propeller), which are to be rated at 22,500 hp. each and will be the largest in the world.

TABLE SHOWING COMPARATIVE SIZES OF SHIPS.

	Tennessee.	New battleships.	New battle cruisers.
Length overall, feet	624	684	874
Beam, feet	97	105	90
Draught, feet	31	33	31
Displacement, tons	33,000	43,200	43,500
Speed, knots	21	23	35
Guns in main battery	12	12	8
Size guns, inches	14	16	16
Shaft horsepower	30,000	60,000	180,000

EDITORIAL COMMENT

Central-Station Company and the Dealer

Not so very many years ago there were practically no retail dealers in electrical goods, excepting for the contractors who supplied lighting fixtures from a catalog and a few samples. At this same time the central-station company was known to its customers chiefly through the medium of the monthly bill, and the monthly bills were not being considered by the customers as something to be thankful for. However, development of the various household devices was followed by the development of a new class of tradesman—the electrical-goods dealer.

These new merchants saw the various electrical devices as salable merchandise and not as consumers of current, while the various central-station managers saw the devices only as current consumers and looked upon many of them in doubt if not with actual disfavor. Due in large measure to the persistent activity of the local dealers, there are now in active service thousands of washers, fans, irons, etc., and the customer compares his monthly service bill with his old laundry bill or measures it against a newly acquired comfort or convenience.

Growth of the appliance business has been accompanied by such a change in public opinion and feeling that it seems evident that good appliances are a major factor in the success of the central-station industry whether they are heavy current users or not. It is also evident that without the support and approval of the central-station industry the small dealer has an uphill road to work. The interests of the two enterprises are so interrelated that it is impossible to injure one without affecting the other, and it is equally as hard to benefit one without to some extent helping the other.

With common interests, it is only natural that the two businesses should co-operate for the common good. One of the most effective means of co-operation is concerted local advertising. A full-page advertisement in the local paper is worth to the industry many times the same space split up into inconspicuous items. And space used regularly is worth many times as much as space used only at irregular intervals. Evident harmony, showing a spirit of confidence in the business and confidence between various branches of the industry, cannot but create and increase a feeling of confidence on the part of the public. And what more could be desired?

Wherever the central-station company has taken an active interest in the local dealers, and helped them to organize or helped them to advertise, the results obtained have more than justified the effort required. However, there are still many places where the spirit of co-operation has not yet developed, or where even a spirit of unfriendliness actually exists. It is time to take stock in such communities, and look about to see what co-operation is doing for others. The central-station company in such a territory would do well to initiate a campaign for the joint interests of the local dealers, and should assist them in building up their businesses along sound financial and merchandising lines.

Contractor-Dealers National Convention

About a year and a half ago the electrical contractors and dealers of the United States gathered in Milwaukee in annual convention. There was not a very large representation, but it was a determined one. Before that meeting in Milwaukee the dealer in electrical appliances did not feel that his business was looked upon with favor by other branches of the industry, at least in the measure it should be.

That Milwaukee meeting proved the turning point for the contractor-dealer. He was there met by bigger brothers of the electrical industry who extended a hand and promised at least a square deal for the contractor who desired to expand his interests by way of the merchandising field. Before that Milwaukee convention the central-station companies practically dominated the merchandising field of electrical appliances and lighting fixtures.

The first national gathering of contractor-dealers since that little Milwaukee gathering is scheduled to be held in Baltimore Oct. 4-9. There will be a great many contractor-dealers present—as compared with the attendance at Milwaukee. In Baltimore they will compare notes, figures, facts, which they are assured will show the unusual growth of the electrical retail business in the past 18 months. The Baltimore convention is expected to disclose conclusive proof that the electrical contractor-dealer has attained an honored place in the business life of the nation, and a respected and honored fellowship in the electrical industry as a whole.

THE WEEK'S NEWS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

OMAHA CONVENTION OF NEBRASKA SECTION, N. E. L. A.

Prominent Speakers Point Out Importance of Power Company in Industrial Life of the Community.

The delegates to the annual convention of the Nebraska Section of the National Electric Light Association, held in Omaha, Sept. 8 and 9, were welcomed by Mayor E. P. Smith, who said he was well aware of the vital importance of the power company in the industrial life of the community. He remarked that in his opinion utilities are entitled to valuations of their property on present costs as a basis for rate making.

J. A. C. Kennedy, Nebraska Power Co., spoke on "Legal Obligations of the Central Station," in which he stated that it was advisable to bring before the public the difficulties under which the utility companies are operating. He also touched on the importance of not underestimating depreciation and the need for better methods of accounting. "Central-Station Merchandising" was the subject of a paper presented by T. E. Roach, Union Light & Power Co., in which the importance of placing the business on its own foundation and making it stand alone was pointed out.

Thorne Browne, Nebraska Railroad Commission, said that the public cannot change the burden of increased costs in such a manner as to bring financial distress to the public utilities. He declared that the utilities are facing an unfavorable past history that has created some suspicion in the public mind, which should be dispelled by the right kind of propaganda. An outline of present rural-line distribution, financing practices, etc., was presented by S. H. Brooks, Continental Gas & Electric Co., in his paper on "Promotion and Development of Rural Transmission Lines." The activities of the National Electric Light Association were explained by President Martin J. Insull, who spoke of the importance of commission regulation.

The election of officers for the ensuing year resulted as follows: President, James B. Harvey, Omaha; vice-president, W. R. Roberts, Omaha; secretary, B. H. Conlee, Beatrice. Executive committee: J. E. Harsh, Lincoln; O. J. Shaw, Lincoln; J. E. Davidson, Omaha; J. B. Harvey, Omaha; W. B. Roberts, Omaha, and C. H. Cornell, Valentine.

NEW ENGLAND DIVISION MEETING AT KINEO, ME.

The New England Geographic Division of the National Electric Light Association held its twelfth annual convention at Kineo, Me., last week. W. S. Murray spoke on the progress of the super-power zone survey. M. H. Aylesworth, executive manager of the N. E. L. A., reviewed the work of the national association for the benefit of the 400 delegates in attendance. The technical reports presented at the Pasadena meeting of the National Electric Light Association were discussed at the technical session. Reports were also submitted by committees on underground systems, electrical apparatus, overhead systems and prime movers, and speakers urged the need of specification for farm-line construction. It was suggested that paper-insulated cable be extensively used, and the use of motor-driven auxiliaries supplied from the house turbine to secure a heat balance was also favored. At the public policy session speeches were made by M. H. Aylesworth, M. R. Bump and W. E. Stanwood. The concluding session was devoted to commercial subjects.

Officers elected are: President, Bowen Tufts, Boston; vice-president, Charles L. Edgar, Boston; executive committee, Edwin A. Barrows, Providence, R. I., and Samuel Ferguson, Hartford, Conn.

INDIANA ASSOCIATION MEETS AT FRENCH LICK.

Importance of Electrical Merchandising and Need of Co-operation of Every Factor in the Industry Impressed Upon Delegates.

The feeling was general at the close of the twelfth annual convention of the Indiana Electric Light Association at French Lick Springs, Sept. 15-17, that a greater understanding of the requirements of the central-station industry of the state has been brought about than had been made possible at any previous meeting.

President P. H. Palmer, Kokomo, in his opening address, said betterment of central-station service and operating conditions could only be secured by adjustments in rates so that companies will be enabled to earn a legitimate profit. When this is done the public and investors will be satisfied, and the industry will be placed on a sound basis.

C. C. Perry, president of the Indianapolis Light & Heat Co., in a paper on "The Public and Public Utilities," said the high degree of co-operation in industry affords the public comforts and conveniences unthought of a few years ago. The progress of communities has been so rapid that the great mass of people fail to realize the advances in the standards of living. It was stated that unfair advantage of this lack of realization is being taken by politicians seeking to advance themselves through misinterpreting the motives of public service corporations. The general feeling created through this source is reflecting itself in the attitude taken by public service commis-

sions whenever a case is presented to them seeking a change of policy that will better the service the public utility is rendering.

During the discussion following the reading of the paper, E. J. Condon and others asserted that the attitude taken by the various public service commissions is responsible for the present low standing of public utility securities when placed in competition with other industrial paper. The lack of support of a state body is in a great many cases affecting the growth of electrical service, particularly the extension of transmission lines to farms and smaller communities. It was stated that the present low earning power allowed the capital of public utility companies prevents the securing of the necessary new money with which to effect plant improvements, properly maintain equipment and extend adequate service. The upward trend of fuel and labor costs is preventing further a showing of earning capacity that would be attractive to investors. This condition could be improved through a slight increase of rates, it was stated.

It is felt that a better understanding of the relationship existing between the public utility and community would make possible the increase in rates necessary for extending and bettering the service. Through a wide educational plan changed public opinion would permit a sufficient increase in earning power to enable utility securities to take their place with other industrial stocks and bonds.

Industry Should Co-operate to Encourage Electrical Retailing.

William L. Goodwin, General Electric Co., sought to impress the delegates with the importance of electrical retailing and the need of voluntary co-operation of central-station companies, manufacturers and contractor-dealers in aiding its growth. He said that while this branch of the industry has grown in three years from practically nothing to a business of tremendous proportions, it is yet in its infancy. The field furnishes a widening outlet for electrical energy.

To begin with, it is important that the electrical industry be popularized with the public. Present trade language should be simplified so that it may come within the comprehension of the layman. The lack of uniform receptacles and plugs, together with the varying voltages and types of current, is proving a serious handicap in extending the use of appliances. The adoption of a universal scheme of applying electricity will materially benefit every one, particularly women.

Mr. Goodwin stated that it is the duty of electrical organizations to disseminate news of electrical activities to the public through newspapers, illustrated lectures and pamphlets. In this way it could be hoped that the general public would come to a realization of the advantages given it by the industry to such an extent possibly as to provide a committee of financial governors composed of men of wide business experience to pass on utility securities and matters affecting the welfare of public service corporations. Mr. Goodwin further urged co-operation between central-station managers and public service commissions in order that there might be a closer understanding of the problems confronting the industry.

Following Mr. Goodwin's address the delegates decided that a standing committee was necessary to assist the Indiana Public Service Commission in solving problems affecting central-station companies. It was further decided that a statement be given the public of the willingness of the members of the Indiana Electric Light Association to co-operate with the commission in matters affecting the furtherance of electrical service. This was referred to the executive committee for action.

George A. Neal, Northern Indiana Gas & Electric Co., Michigan City, read a paper on "Reduced Operating Expenses vs. Increased Fixed Charges," in which the statement was made that the electric utility has built its business upon its ability to save its patrons personal labor. The growth of the business is a testimonial to the value of the service. Analysis of its own service, therefore, will probably show that there may be latent possibilities for better operating results to be achieved by the adaptation of new labor-saving methods and equipment to overcome present difficulties.

It was stated that an investment once made is permanent until retired out of earnings. The fixed charges auxiliary to the investment must be met. If money is invested in equipment based upon operating economies obtained with the present labor scale and labor efficiency, the present margin may be obtained throughout the life of the equipment, or the immediate benefits may be wiped out by a change in labor rates. Upon the solution of future labor costs, therefore, rests the decision regarding improvements.

Shows Need for Good Lighting Among Industrial Plants.

M. C. Turpin, Westinghouse Electric & Manufacturing Co., indicated a need for spreading the gospel of good lighting among industrial plants. He stated that in a survey of 450 plants it was learned that 30% had not changed their lighting systems in five years, and that but 40% of the plants visited were properly lighted. He said it had been proven that good factory lighting had shown an increase in production, reduction of spoilage, an improvement in sanitary conditions and a higher morale. Good lighting insures a more uniform product and a loyalty among employes that is reducing the labor turnover. A study of the farm-extension idea for developing central-station business was advocated, the statement being made that there are more than 2,000,000 farm prospects for equipment.

A paper on "Power-Factor Correction and Its Effect" was presented by Thomas F. English, general manager of the Indiana General Service Co., Muncie, which gave methods of correcting power-factor and of penalizing low power-factor.

E. I. Lewis, chairman of the Indiana Public Service Commission, said he believed that by inserting a clause in contracts stating that the rates contained therein are contingent on such action as the state supervising body might take, considerable difficulty can be eliminated in the event of a change in rates. He commented on the fact that his work in connection with the public

utilities of the state has given him a broad knowledge of the importance of their service to the people, and that at the termination of his period in office next year it is likely that he will write articles along those lines for national publication.

F. A. Bryan pointed out the economic loss to government in appointing a man to an office, training him in the conduct of the office, and then at a time when his usefulness to the community is at its height discharging him and commencing the procedure all over again. Mr. Bryan recommended the appointment of men having previous knowledge of the professions with which their offices are destined to work, in order that better understanding of the problems confronting the office may be made possible.

At the Friday morning session H. A. Merrill, General Electric Co., spoke briefly on the industrial application of electricity. Morse Dell Plain stated that the sale of power should be classed separately and not as a form of public service. He said rates should be determined in a similar manner to those of other commodities and that as such it should be free from public regulation.

ACTION TAKEN ON JOINING GREAT LAKES DIVISION.

R. V. Prather, secretary-treasurer of the Great Lakes Geographic Division of the National Electric Light Association, in submitting the question of the Indiana Electric Light Association joining the division, explained that in no way would the division supervise the activities of the association, but that the work would be carried on in co-ordination with the Illinois, Michigan, and Wisconsin associations.

Harry Reed, C. C. Perry, G. A. Neal and E. J. Condon led in the discussion as to the advisability of joining. The question was referred to the incoming executive committee with authority to act.

The election of officers and committees resulted as follows: President, Morse Dell Plain, Hammond; vice-president, E. M. Walker, Terre Haute; secretary-treasurer, Thomas Donohue, LaFayette; executive committee, P. H. Palmer (chairman), S. W. Greenland, Harry Reed, C. O'B. Murphy and C. C. Perry; advisory committee, Charles Calvert, M. V. Robb and E. J. Condon; public policy committee, Thomas F. English, J. A. Brown, John W. Brockman, H. T. Pritchard and T. A. Wynne.

EDISON ILLUMINATING COMPANIES RE-ELECT OFFICERS.

The thirty-ninth convention of the Association of Edison Illuminating Companies, held at the Hotel Griswold, New London, Conn., proved to be one of the most interesting and enjoyable meetings of the organization. An outline of the program was given in last week's issue of ELECTRICAL REVIEW.

The entertainment features consisted of golf, tennis, boating and dancing, together with a reception by President and Mrs. Walter H. Johnson on the evening of Sept. 13. The annual dinner was held Sept. 16, at which time the re-elected officers were installed. They are: Walter H. Johnson, Philadelphia, president; M. S. Sloan, Brooklyn, vice-president; Preston S. Millar, New York City, secretary, and Ernest A. Edkins, Chicago, treasurer. The executive committee consists of the above with Charles L. Edgar, Boston; W. W. Freeman, Cincinnati; Samuel Insull, Chicago; John W. Lieb, New York City, and Joseph B. McCall, Philadelphia.

WESTERN PENNSYLVANIA ENGINEERS HOLD MEETING.

The monthly meeting of the Engineers' Society of Western Pennsylvania was held in Pittsburgh Sept. 21. W. J. A. London, president of the Steam Motors Co., Springfield, Mass., presented a paper on "Small Steam Turbines," in which the steam-turbine field was divided into three classes, viz., large main units, intermediate sizes and non-condensing machines for auxiliaries and isolated plants. The paper dealt exclusively with the latter class, and was illustrated by lantern slides.

COMING CONVENTIONS.

National Safety Council. Ninth annual safety congress, Auditorium, Milwaukee, Wis., Sept. 27-Oct. 1. Headquarters, Wisconsin Hotel. Secretary, S. J. Williams, 168 North Michigan avenue, Chicago.

American Electrochemical Society. Annual convention, Cleveland, Sept. 30-Oct. 2. Headquarters, Statler Hotel. Secretary, Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa.

Illuminating Engineering Society. Annual convention, Cleveland, Oct. 4-7. General secretary, Clarence L. Law, 29 West 39th street, New York City.

National Association of Electrical Contractors and Dealers. Annual convention, Baltimore, Md., Oct. 4-9. Headquarters, Southern Hotel. Secretary, W. H. Morton, 110 West 40th street, New York City.

Electric Furnace Association. Meeting at Ohio State University, Columbus, O., Oct. 6. Secretary, C. G. Schluederberg, Box 911, Pittsburgh, Pa.

Empire State Gas and Electric Association. Annual convention, Utica, N. Y., Oct. 7-8. Headquarters, Hotel Utica. Secretary, Charles H. B. Chapin, Grand Central Terminal building, New York City.

Water Power League of America. Annual convention, Washington, D. C., Oct. 7-8. Headquarters, Washington Hotel. Secretary's office, 116 Nassau street, New York City.

American Institute of Electrical Engineers. First regular fall meeting, Philadelphia, Oct. 8. Secretary, F. L. Hutchinson, 33 West 39th street, New York City.

British Columbia Association of Electrical Contractors and Dealers. Annual convention, Vancouver, B. C., Can., Oct. 9.

American Electric Railway Association. Annual convention, Atlantic City, N. J., Oct. 11-15.

National Association of Electrical Inspectors. Annual meeting, Philadelphia, Oct. 12-13. Secretary, W. L. Smith, Concord, Mass.

International Association of Municipal Electricians. Annual convention, New Orleans, La., Oct. 19-22. Secretary, Clarence R. George, Houston, Tex.

Association of Railway Electrical Engineers. Annual convention, Chicago, Oct. 28-30.

National Association of Railway and Utilities Commissioners. Annual convention in the board room of the Interstate Commerce Commission, Washington, D. C., Nov. 9-12.

American Institute of Electrical Engineers. Meeting in Chicago Nov. 12 under auspices of the Protective Devices Committee. Secretary, F. L. Hutchinson, 33 West 39th street, New York City.

Electric Power Club. Fall meeting. Hot Springs, Va., Nov. 15-18. Headquarters, Homestead Hotel. Secretary, C. H. Roth, Adams and Loomis streets, Chicago.

Southeastern Geographic Division of the National Electric Light Association. Annual convention, Miami, Fla., Nov. 17-19. Secretary, Charles A. Collier, Atlanta, Ga.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

ARRANGING APPLIANCE SALES FOR FALL AND WINTER.

In the selling field of appliances August is ordinarily a dull month, but the sales record of the Public Service Co. of Northern Illinois for last month was a better one than that for the corresponding period in 1919. The inquiries most marked were for electrically operated labor-saving devices such as washers, vacuum cleaners and irons. In several of the towns served by the company systematic campaigns were conducted in selling washers. The mercantile sales department of the company is arranging a number of appliance sales at different times during the fall and early winter months, these to include not only the labor-saving devices but others as well.

EFFECT OF PRICES ON ECONOMICS OF THE CENTRAL STATION.

Factors in Reduction of Prices—Results of Inflation of Currency—Replacement Cost Basis for Return.

By R. S. HALE

Superintendent of Special Research Department, Edison Electric Illuminating Co. of Boston.

The first study is as to the future of prices, considered as a whole and not any relationship between wholesale and retail, power or light, etc. The price situation is, on the whole, satisfactory, and by that is meant that prices and incomes are such that new money is being attracted into the central-station industry. It is difficult to raise money, but electric utility companies are finding it no harder to get new money than cotton factories or steel mills or gas plants, etc. While the price situation, even of today, is satisfactory, yet for various reasons it is simpler to take 1913 as a basing point, since in 1913 not only the price situation but also the prices themselves were on the whole surely satisfactory.

Taking 1913 as a basing point, there had been three causes of lower prices—causes which are still continuing. First is the decreased cost of generation due to the increased size of generating units. We forget sometimes how much of the reduction in cost is due merely to the size of units. The 100,000-kw. plant in comparison with 100-kw. plant is far more efficient than the 100-kw. plant of today is in comparison with the 100-kw. plant of 25 years ago; that is, the decreased cost is due to size and not to time. Since the capacity of the average plant of today is probably well under 5,000 kw., while the limit of size appears to be not under 200,000 to 300,000 kw., there will surely be a still further reduction in cost. The limit of size of unit appears to be somewhere in the neighborhood of 50,000 kw. on a single turbine shaft, and a limit of somewhere around 200,000 or 300,000 kw. at a single station, the latter on account of the supply of condensing water. Now, when all or nearly all of the electricity is produced in the big stations of the future the average cost of generation should be reduced, other things being equal, to something like one-half of the present average cost of generation.

DENSITY OF DISTRIBUTION A FACTOR IN REDUCING PRICES.

A second cause of reduction of prices is the reduction in cost at the customer's service, due to greater density. When every house along a street is supplied the cost of poles, trenches, meter reading, etc., per kilowatt-hour is much less than when only a few houses are supplied. To supply one 500-kw. load to a factory in a town costs far more per kilowatt for lines and distribution expense than to supply ten such factories within the same area. To supply 1000 kw-hrs. a year to a residence for lighting, cooking, washing, etc., costs less per kilowatt-hour than if the residence used only 300 kw-hrs. per year.

A third cause of reduction of costs is the improvement of the art and new inventions; but a little thought shows us that this cause is less effective than we may have supposed. I would put down only six great inventions in our field. Among these would be the generator itself, the motor, and the carbon lamp. Add the transformer, and perhaps the tungsten lamp and the modern turbine, and what else is there except refinement of details? We have, of course, made immense improvement in details, but, on the other hand, so have our competitors.

Now, in spite of the three causes for reduction in costs and prices we are all familiar with the rise in costs and prices since 1913, due to the inflation of the currency.

These may be considered in two parts, first, as regards operating costs, and, second, as regards fixed charges. As regards operating costs the industry is largely the industry of a middleman. We buy coal, labor, oil, etc., and transform these into electrical energy and sell the product.

The building or factory that tries to get along without our services pays far more than if it deals with us. Any factory owner, however, can increase his selling price parallel with the buying price, and if other things had been equal all of us should have had to increase selling prices to balance the increase in operating expenses. That a very few have avoided this entirely, and that so many have been able to keep the rise in prices down to a small percentage has been due to the decreases in cost due to large units and greater density, and also to the fact that the fixed charges on 1913 investments have not increased.

This latter point is the one which needs special

attention. An investment in a utility is different from an investment in an ordinary factory or house or farm. The farmer owned property worth, say, $10,000 in 1913. He sold his crops to the market and presumably earned net, say $600, or 6% of the value of his farm. When prices went up he still sold his crop at the market and earned $1200 or $2400 over and above his labor; this is 12% or 24% on the 1913 value of his farm, but probably only 6% or 8% on the selling price of his farm today. The same is true of the factory or house, which will earn for the owner a return on what he can sell them for. The value of a farm or factory depends on their earning power, as well as on what it will cost to replace them; and the earning power and value are functions of each other for other than public utilities.

In the case of utility investments, however, we are not allowed to increase prices so as to pay a return on what it would cost to replace the investment, i.e., on the replacement value, though the factory owner can sell the goods from his factory built in 1913 at the same price that will give him a fair return on the factory that he built in 1919, just as he can after allowing for depreciation and obsolescence sell his old factory at a price corresponding to its replacement value at today's prices.

Utilities Should Be Able to Pay Return on Replacement Cost.

Analyzing this we find that utility investments are not ownership in plants similar to the ownership of an ordinary farm or factory, but all common stockholders really own is a mortgage, a mortgage on which the rate of interest may vary, but only a mortgage with no right to the increased value when the value or cost of replacement goes up. The value of a utility investment under commission rulings is its original cost rather than its replacement cost.

This fact is disputed, but there is some proof. C. D. Jackson of the Wisconsin Railroad Commission said at the Pasadena convention that on account of variation in costs from year to year the investment rather than the replacement cost should be the basis of rates. The Massachusetts commission has recently said the same thing, and, what is more, said it many years ago when it found companies with an investment greater than the then structural value of the property. The Massachusetts commission said that as this situation was due to the rapid advancement in the art and not to any fault of the investors, therefore the company could charge prices that would not only pay some dividends on the investment but would furnish a surplus enough gradually to bring the property back, so that its value should equal the investment.

It is clear that we are not going to be allowed to capitalize the increase in value of the plants that were installed in 1913 and before, and I know of no companies that have done so. The way it has worked and the way it is going to work is that fixed charges on the plant of 1913 have not and will not increase, and, therefore, the increased costs of turbines, boilers, etc., does not affect the portion of business done with the 1913 plant.

Next, let us consider what is going to happen; in fact, what is happening. We have a plant that costs $1,000,000 in 1913, and we were and are earning $80,000, or 8% on the business done by that plant. The business grows and the next plant of the same size costs $2,000,000, but does no more business. To get the money for the new plant we must pay 8% on the new investment, or $160,000, but we must charge the same price for electricity to the new customers as to the old. The result, therefore, is and will be that as business grows we must raise prices to all customers, old as well as new, so that we shall get $80,000 plus $160,000, or $240,000, to pay the fixed charges on the total investment, which is now $3,000,000, or triple, while the business done is only double.

In practice we do not double our plant at a single stroke, but, on the other hand, looking forward 10 or 20 or 30 years, we can foresee a time when practically all investment will have been made at the high prices either because it is for new business since 1913, or because the 1913 plant has worn out and has been replaced by new plant at the high prices. The time will, therefore, finally come when the investment or money put in by the investors corresponds to the then replacement value of the plant and the prices for electricity must then be enough to pay operating expenses and fixed charges, all figured on the high prices of labor and material.

The difference between the utility business and the ordinary factory or farm is that in the case of the ordinary property the effect of inflation is quick, so that the inflation of the currency raises the price of the goods and raises the values of the plants at the same time, or nearly the same time. In the case of the utility the inflation raises operating costs at once and this raises the proportion of prices, which recoups us for operating costs; but the inflation of the currency does not raise fixed charges on the old investment, and, therefore, the effect of inflation on the portion of prices that depends on fixed charges is slow, depending on how fast we grow and on how fast the old 1913 plant wears out and has to be replaced at the higher costs.

It follows that in the case of utilities there will be a cause acting for many years to raise prices above the present level. It is possible, of course, that the currency will be finally deflated so as to bring prices down, in which case the reverse action will result. Further, the increase in size of units and the increase of density of distribution may balance the increase in cost due to the gradual increase in the amount we must include in prices to earn fixed charges on the new investment at the high prices as well as on the investment that was made before general prices went up.

In my opinion, however, this cause, i.e., the increase in fixed charges due to the higher investment costs, will, in the next few years, nearly balance the decreases in cost due to increased size of units and due to increased density of distribution. So that I look forward to but little reduction in present prices for electricity until some time after the deflation of the currency (if it ever occurs) has had its effect on prices generally.

CONTRACTOR-DEALER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-keeping for the Dealer in Electrical Goods

TIME PAYMENTS REQUIRE SOME DIPLOMATIC HANDLING.

One Contractor-Dealer Converts Many Clients Into Cash Buyers When They Find They Save a Few Dollars by So Doing.

"It is surprising to me what a number of my customers are willing to pay cash instead of taking advantage of the deferred payment plan when they learn that the cash plan saves them a few dollars," said an electrical dealer recently.

It is the usual custom of dealers in electrical goods, as well as dealers in other kinds of merchandise, to add a few dollars to the price of the larger appliances in time-payment sales to care for the extra accounting, billing, collections and risk of credit business. This is usually well understood by the customer, who is generally willing to pay a little extra for the accommodation afforded by deferred payments.

"I always try to learn in as diplomatic a manner as possible," said the dealer, "whether the customer can afford to pay cash before I offer the installment plan. Even when people come into the store in response to our time-payment advertising, I try to find out if a dollar or two discount is of any value to them in a cash transaction. But this has to be handled in an inoffensive manner so that the sale and a new customer will not be lost because of a misunderstanding."

STORE ARRANGEMENT FOR COMFORT AND CONVENIENCE.

Roomy Aisles, Attractive Displays and Easy Chairs Invite Customers to Linger and Buy Where Goods May Be Studied with Ease.

The accompanying photograph shows a well-arranged store in which the principles of merchandising display are well carried out. On the left may be seen an exceptionally attractive arrangement of appliance and lamp cartons on the wall shelves. An open counter, displaying small merchandise such as flashlights and bell transformers, is located near the cash register.

Specialties such as sew-motors, sewing machines, vibrators, etc., are displayed on the tables which occupy the center of the store. On either side of these tables is a wide aisle with carpet

One Dealer Finds This Store Arrangement Attractive to His Customers.

runners extending from the front to the rear of the store. This arrangement not only gives the store an appearance of depth, but also gives the customer a freedom of movement and opportunity to examine the stock. The large rug, cretonned arm chair, rocker and table give a home touch which is very desirable.

The display of literature on the round table is well placed. The waiting customer, reclining with ease in the large comfortable chair, is often prompted to read literature placed near him. By using a boudoir lamp on the table and the luminous heater shown on the floor, the home effect is more effectively produced. Careful placing of efficient and attractive overhead lighting fixtures give a pleasing effect and ample illumination.

Attractive Window Displays Responsible for Larger Sale of Electric Fans for Many Purposes

More Fans Sold This Year Than Ever Before—Dealers Prepare to Keep Campaign Going for All-Season Use of Fans — Selling by Mailing List

By W. B. STODDARD

Dealers usually close the fan merchandising season the first of September. Many of them will not do so this year. Instead, they will continue to point to the electric fan as a household necessity, but instead of emphasizing its cooling effects they will advocate its use for drying fruit and vegetables, for ventilation, for stimulating sluggish radiators the coming winter, and some other uses to which the electric fan may be put the year round.

This has been a very successful year thus far for the sale of electric fans despite the unusually cool summer. Much of the success may have been due to the elaborate displays and demonstrations placed in the show windows by dealers. The Knight Electric Co., Portland, Ore., recently demonstrated in an artistic and practical manner the "cool wave" that comes with the installation of an electric fan. Its window was backed with mottled blue paper to represent the sky. The floor was billowed with soft, white cloth sprinkled with diamond dust, presenting a very good imitation of waves. In the background was a jagged cutout of cardboard showing an especially high wave. On a pedestal behind the big wave was placed a large electric fan. Suspended above the fan was a show card with the words "A Cool Wave Is Here."

Crowds Like Push-Button Demonstrations.

Among the simulated billows on the floor of the same window were placed several small desk fans with a card bearing the admonition, "A breath of the sea—Get a six-inch fan and keep cool—Only $6.25." Above the blue-paper clouds on the wall floated an American flag whose folds were kept in motion by an electric fan. Another window was dressed to represent a student's den. An oak table was covered with a leather throw upon which rested a rack of books, a student's lamp and an electric fan. A comfortable chair was placed beside the table, and conveniently near was a fully equipped smoker's stand. A show card advised, "Don't wait for the weatherman—create your own cool wave." The price of the fan was included on the card.

One dealer hung outside his store a long panel bearing a huge red interrogation mark which covered the length of the panel. Over this was painted in black letters, "Hot? Then get cool! Merely press the button." An arrow led to the button below the sign. This button was connected by a cord to an electric fan resting on a bracket above the panel. As long as the button was pressed the fan would revolve and send a current of cool air about the person or crowd below. Needless to say that it proved a profitable selling device. This dealer expects to vary the display from time to time.

The Southern California Electric Co., Los Angeles, recently used the push-button device to attract attention to its appliances, particularly the

Arrangement of Fourth of July Window Display by Kimball Electric Co., Oakland, Cal.

electric fans. In the background was suspended a large flag and in front of it a number of electric fans were placed. A show card read: "Best fan for home use. Pleasing in appearance, great in economy, light in weight; gives the most breeze for the least consumption of electricity." Set in standards were several flags kept in motion by the fans. Down in front were a number of small desk fans. Over the card in the background was suspended an incandescent lamp with a blue shade. In the center of the display, on a mound of blue velvet, was a wireless outfit. A push button was attached to the outer side of the window with a card which read: "Run the electric appliances by means of wireless control. PUSH THE BUTTON." The pushing of the button caused the lamp to flash, the wireless outfit to spark, a sewing machine motor to run and

the fans to whirl. Cards attached to each article gave the prices.

TWO OTHER WINDOW DISPLAYS FEATURING

The Kimball Electric Co., Oakland, Cal., dressed a very effective fan display for its Fourth of July window. Over a tall pedestal was draped

Effective Lamp and Fan Display by Nielson-Smith Electric Co., Santa Barbara, Cal.

a big flag. Placed on smaller pedestals and on the floor were a number of electric fans of different sizes, all in motion. One show card advised that, "If it isn't in sight, it's inside if it's electrical." Another card read: "Put electricity, the modern and dependable servant, to work in your home."

Another window display that included electric fans and created much interest was that of the Nielson-Smith Electric Co., Santa Barbara, Cal. The large window had a shelf extending the entire length of the back and sides. It was covered with a green cloth upon which were shown incandescent lamps boxed and unboxed. A border of flame-colored velvet extended around the floor, and on this were deposited a number of the lamps. On a central mound of flame-colored velvet rested half a dozen small electric fans while larger fans were placed on either side. Attractive show cards increased the value of the display.

One of the most effective uses to which the electric fan was placed this summer, particularly at inland water resorts, was to drive away mosquitoes from porches and verandas as well as from the beds at night. Not alone did the fans keep off the mosquitoes, but they also chased the bugs peculiar to most water resorts.

Schelly & Brothers, Allentown, Pa., used the telephone effectively this year as a means to seli electric fans to people who found it inconvenient to visit the store. This firm prepared a form letter, giving each one a personal touch by writing in the addresses on the typewriter, and sending them to a select list of home owners. The letter was as follows:

> Dear Madam:—Probably you have had it in mind frequently to buy an electric fan for these hot days, but you could not find time to come down to the store—or perhaps it slipped your memory when down town.
>
> TELEPHONE—It's the easiest way, and you will get as prompt attention, equal service, and we guarantee satisfaction the same as if you called personally. Just ring up Main 1333.
>
> Cordially yours,
>
> Schelly & Brothers.

Such a letter could be rearranged to apply to the use of the fan for drying fruits and vegetables, or for winter use in ventilating, circulating heat, drying clothes on rainy or wintry wash days. Thus would the all-year round use of the electric fan be stimulated.

Window Displays With Local Angle May Be Made to Sell More Appliances for the Dealer

One Indiana Contractor-Dealer Proves the Value of Localizing His Displays by Showing Names and Addresses of Customers in His City

By FRANK H. WILLIAMS

Localizing the window display, while seldom indulged in by electrical contractor-dealers, has proved an excellent drawing card wherever tried. It is a departure from the usual style of window displays, but it is one that has proved valuable in other lines because anything of a local nature, even in the newspapers, attracts first attention. It seems to be a trait of human nature to want to know what your neighbor is doing.

Recently the Edmunds Electric Co., Fort Wayne, Ind., proved the value of a localized window display as a sidewalk attraction and business stimulator. An electric washing machine was placed in the window and set to work churning up a billow of suds. The motion naturally attracted a great many people whose interest almost immediately became riveted upon a showcard which read:

> Look at the map next to this placard. See the red stars on the map. Notice that each star is numbered. Now look at the corresponding number on this placard. You will see that opposite each number is the name of an individual. Each of the persons named on this placard is the happy owner of one of these Blank washers. Whom do you know in your neighborhood that is an owner of this kind of washing machine? Then resolve to make your own home brighter, too, by bringing into it a Blank washer.

As long as this interesting display remained in the window there was a large crowd to be found in front of it. The appearance of the names and addresses of people who had purchased one of the washers, together with the location of their homes on the map proved attractive to hundreds of people every day, and this interest resulted in a large number of sales for the washer which might not have been made but for the unusual

local appeal. This method should prove equally good in any small or medium-sized city where the residents are more or less acquainted with, or know of each other.

SPECIAL WEEKS FOR LOCALIZED DISPLAYS.

The idea does not necessarily need to be applied to washers alone. It could be used with equally good success for vacuum cleaners, electric ranges, sewing machines and any large appliance which is not sold in such large quantities as to obliterate the street lines if all the purchasers were designated on the map with red stars.

As a variation from the above idea the electrical dealer may arrange to have an "Old Customers' Week." For a week in advance, the special week may be announced upon a showcard placed in the window display, and reading about as follows:

> Next week we are going to have an "Old Customers' Week." We want to secure as many names as possible of customers who have been trading with us for one, two, three years or longer. So, during the week we are going to have a registration booth in which we hope you will register and state the length of time you have been trading with us. To every customer who registers we will present a carnation. Remember we want you to register whether you have been trading with us a long time or not. We are going to put in this window next week the names and addresses of some of the people who have been our patrons for the longest time. In addition we are going to have a display of some old-time electrical appliances. This display will be of especial interest to you because it will show the immense advances which have been made in the manufacture of electrical household conveniences. We will also have some old-time photographs of the city on display which should prove of interest to every resident as well as every visitor here.

Another suggestion to follow the above displays would be to arrange a display of the most popular sellers in the stock of appliances carried by the store. If the store sells a large number of percolators, for instance, it may include a percolator in the display and let a card tell some of the comments made by purchasers as to why they like it. The same policy may be followed with a toaster, a vacuum cleaner and several other popular appliances. When the display is arranged a large showcard may be displayed with something like the following:

> OUR SIX BEST SELLERS!
>
> Here are the electrical appliances that local people seem to like best of all, judging from our sales. And here are some of the reasons they give for their preferences. What sort of an electrical appliance would YOU like in your home? Come in and talk to us about it. We have it at the price you want to pay.

There are many other angles to which the localization of window displays may be put, and which can be developed to conform with the location and class of custom of the different contractor-dealers.

ASK PERMISSION TO USE ILLINOIS RIVER POWER.

According to advices from Washington, D. C., under date of Sept. 18, the Federal Power Commission has received a license application from the state of Illinois for the utilization of potential water power on the Illinois river in conjunction with the construction of the projected lakes-to-gulf water route. The plans provide for four power plants on the river to develop a minimum of 40,000 hp. Their construction will be carried out in connection with the development of a navigable course on the river to connect with the Chicago sanitary canal at Lockport, Ill. Formal license for this project also will be issued at an early date, it is stated.

HYDROELECTRIC DEVELOPMENT OF WATER POWER.

The National Water Power bill, permitting hydroelectric development of waters under federal control, points a way to the solution of the fuel problem, according to William A. Gaston, chairman of the board of the National Shawmut Bank of Boston, as New England water alone can supply 2,000,000 hp.

PUSH-BUTTON ALWAYS EFFECTIVE IN WINDOW DISPLAY.

The idea shown in the accompanying illustration, furnished by the Westinghouse Electric & Manufacturing Co., is by no means new, but it is always effective in a window display if properly executed. This is a very good example of playing upon a person's curiosity, or their desire to push the button and see things operate under their control.

This window is well arranged and shows all the appliances to good advantage. Pasted on the glass front is a card with a push button in

Not New, but Always Effective Method of Attracting Attention to Window Display.

the center of it. On the card above and below the button are the words, "Push Here—Wireless Control." Pasted on the glass in various other places, and all pointing directly toward the button, are flaming arrows of paper on which is printed, "Push the Button."

In the display are a clothes washer and wringer, two portable sewing machines, a vacuum cleaner, electric fan, "Cosy Glow" air heater, incandescent lamps, etc. At a push of the button all of the machines are set in operation, the heater sends out a warm glow and the lamps begin to flash. This continues as long as the button is pressed—and it was kept pretty busy every day it was installed in this particular window.

QUESTIONS AND ANSWERS

Readers Are Invited to Submit Contributions Pertaining to Electrical Matters to This Department — Payment Will Be Made for All Answers Printed

Questions.

No. 497.—Use of Reactors on Transmission Lines.—What are the factors which govern the size of a reactor that should be installed on a transmission cable to give protection from grounds? Do reactors that are suitable for protection against short-circuits give the same degree of protection against grounds? Are reactors essential or useful on well constructed overhead lines? Can overload relays be safely eliminated on lines that are properly protected by reactors?—A. B. R., Peoria, Ill.

No. 501.—Creosote Treatment of Crossarms.—Does the treatment of crossarms with creosote add anything to the safety of a 2300-volt line in case an insulator is broken allowing the bare wire to fall on the arm? Will the treatment of the pole with creosote tend to prevent a leak to ground under similar circumstances? Will the effect be different for higher or lower voltages?—V. N. H., Cedar Rapids, Ia.

No. 502.—Suitable Oil for Motors.—We have been having considerable trouble with the heating of bearings on motors operating in a fruit-canning plant. Different grades and mixtures of oil have been used without satisfactory results. Is not a regular motor oil superior to machine oil for this purpose? Also, is it not common practice to use a heavier-bodied oil for large motors than for smaller ones I would like to know of a good test for motor oil.—G. L. G., Holcomb, N. Y.

No. 503.—Metering Combined Power and Lighting Load.—Will someone kindly explain how a metering equipment should be laid out to properly measure the power delivered to a combination of lighting circuits and three-phase motors? Service is supplied from a delta-connected bank of three 15-kw. transformers. The lighting load, which has a maximum demand of about 4 kw., is connected between the two sides and neutral of one of the transformers. This lighting load varies from a small amount during most of the day to the maximum for about three hours. The power load consists of seven 3-hp. motors, four 5-hp. motors, two 7.5-hp. motors and two 10-hp. motors.

The motors are all three-phase, 220-volt induction motors and do not all operate at the same time. The lighting circuits operate on the 220-110-volt, three-wire system, and are often badly unbalanced. Maximum demand must be measured as well as the total power consumed.—J. O. R., Kansas City, Mo.

No. 504.—Controlling Motor From Two Locations.—I have a 5-hp., induction motor which is started from half-taps on a three-phase transformer bank by means of a three-pole, double-throw switch. Will someone please show how such a motor can be started and stopped from two different locations?—N. W. C., Denver, Colo.

Answers.

No. 491.—Paralelling Belted Exciters.—Considerable difficulty is experienced in paralleling the exciters in the plant where I operate. There are two 150-kw. alternators direct-connected to Corliss engines in this plant. There is a 20-kw. exciter belted to each engine. These exciters carry a small amount of d-c. load during the day aside from serving as exciters. Our practice in paralleling is as follows: With one machine running and connected to the system, the second machine is brought up to proper speed as indicated by the synchronizing lamps. The incoming exciter is then brought up to voltage a little above the exciter-bus voltage and then connected. The second alternator is brought up to proper voltage a little above the main bus and cut into service.

In the period just before connecting in the second alternator, the two exciters sometimes give trouble. They will shift the load from one to the other, sometimes slowly and sometimes quite rapidly. Will someone tell me what the cause of this is and how this condition can be overcome? These alternators have to be paralleled every day and the exciter trouble is quite annoying.—J. C. B., Cincinnati.

Answer.—Obviously the trouble experienced in this case is with the exciters rather than with the alternators. The writer assumes that the exciters in question are compound-wound machines in accordance with standard practice. Unless machines of this type have exactly the same external characteristics, their parallel operation is very unstable, one machine often carrying a great portion if not the entire load. This tendency may be corrected by varying the series-field shunt so that both machines have the same characteristics. The best method of parallel connection and operation requires the use of an equalizer bus to connect and balance the series windings, thus making regulation of load division practically automatic.

It is evident that the machines described are unstable in their parallel operation because of unequal series-field strength.—W. F. P., Atlantic, Mass.

No. 498.—Motor-Operated Centrifugal Pump.—I have recently re-installed a motor-driven centrifugal pump and have had a considerable amount of trouble in trying to make it operate. This pump is driven by a three-phase 5-hp. induction motor having a synchronous speed of 1200 r.p.m. The pump, as originally installed, delivered water from a tank at about the same elevation as the pump suction to another tank located 25 ft. above. As now installed, the pump has to raise the water only 7.5 ft., but continually blows the fuses and heats up badly. The motor is not grounded or short-circuited and the pump seems to be in good order. I have increased the suction and discharge lines from 2-in. to 3-in. pipe without relieving the trouble. What can be the cause of the difficulty?—B. R. D., Atlanta, Ga.

Answer.—One of the peculiarities of the centrifugal pump is that the power required varies inversely with the discharge head; that is, the pump would consume maximum energy when discharging without any pipe attached. In this case the length of the discharge pipe has been altered and therein probably lies the trouble. A constant-speed motor is suitable only when working conditions are constant, and if the delivery varies when using a constant-speed motor it is liable to be considerably overloaded. It is important that the pump be operated at its designed flow as nearly as possible. The formula, $P = 0.0003\,H\,I$, may be used to compute the power required to run a pump. In this formula, P represents the horsepower required, I represents the discharge in cu. ft. per min., and H represents the total head in feet (including friction head).—J. S., Cumberland, B. C.

Answer.—The pump in question doubtless is of the volute type designed for a speed of 1200 r.p.m. and a 25-ft. head. The usual characteristics of a pump of this description are such that, with constant head, the volume of water discharged will vary as the square of the speed, and with constant speed it will vary inversely as the square of the head. The head is therefore proportional to the square of the speed, the volume being proportional to the speed.

The driving power required will vary directly with the product of capacity and head, or as the cube of the speed, and it follows that the load on the motor will increase as the head is reduced by an amount depending on the pump design.

Assuming the pump capacity to be 300 g.p.m. at a speed of 1200 r.p.m. and 25-ft. head, when the head is reduced to 7.5 ft., with the speed remaining constant, the volume will be inversely proportional to the squares of 25 and 7.5, respectively, or more than 11 times as great.

Allowing for the increased friction head, the pump at 7.5-ft. head would probably deliver 3000 g.p.m. Figuring from the formula, $Hp. = (G \times H)/(3960 \times E)$, where G = gallons discharged per min., H = head in feet, and E = efficiency of pump, the motor load may be calculated in horsepower.

With an efficiency of 50% it would require an input of about 11 hp. to drive the motor with the pump operating under the 7.5-ft. head. Thus the motor is subjected to an overload of 100%.

As a remedy, it is suggested that the speed of the pump be reduced to about 500 r.p.m., the actual speed required being determined by trial. Trial speed determination is desirable since the efficiency varies with different speeds. A valve may be placed in the discharge line and throttled down until the gauge shows a pressure corresponding to a 25-ft. head. Under these conditions the power required and the discharge will be the same as before the change in head was made. A new impeller for 7.5-ft. head, which would correct the conditions, doubtless could be secured from the pump manufacturer.—S. D. S., Columbus, O.

No. 495.—Synchronous Motor as a Condenser.—Will someone please explain for me just how it is that a synchronous motor acts like a condenser? I have read any number of articles on the use of motors as condensers, but have never had a clear explanation given as to how such an effect is produced.—R. H. N., Peoria, Ill.

Answer.—The reason for the action of a synchronous motor as a condenser is not clearly obvious without a study of the magnetic circuit of the motor. Fig. 1 represents a two-pole motor with one coil on the armature, this being a synchronous motor in its simplest form. Fig. 2 is a developed diagram of Fig. 1. Conductor A is under the center of the N pole, and when A carries current the flux due to this armature current bucks, and partly neutralizes, the main field flux on one side of the wire. It also adds the same amount to the main field on the other side of the wire, resulting in a net unchanged field.

Next consider position A' of the armature wire. Here the flux due to the armature current bucks and decreases the main field under the right side of the N pole, resulting in a net total reduction of the main field flux. The flux due to A' on its right side does not affect the main field, as it is not in its sphere of action. In position A' the current in this conductor is leading. It is assumed in both positions, A and A', that the currents are a maximum, and obviously the induced voltage in the conductor is a maximum in position A. It therefore follows that the current in position A represents unity power-factor of the power supply, and position A' represents a leading current, the current reaching its maximum value before the position A where the voltage is a maximum.

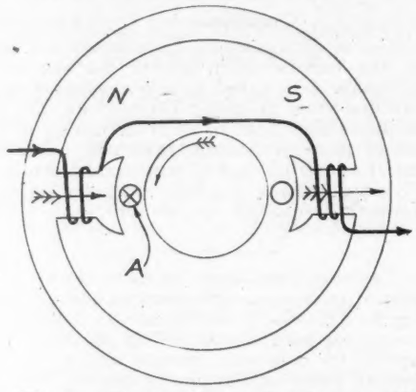


Fig. 1.—Diagram Representing a Synchronous Motor in the Most Simple Form.

In a motor the line voltage and induced voltage are sensibly equal, the induced voltage being represented by the equation $E = Q \times N \times n$, where Q = field flux, N = turns on the armature and n = frequency of supply in cycles per second. For a given system n is fixed, say at 25 cycles, N is also fixed and E is constant within a few per cent. Then Q must also be practically constant. In the position A' of the armature conductor, however, Q has been reduced by the demagnetizing effect of the current in A', which is a leading current, and to make up the necessary field flux so that E may equal $Q \times N \times n$ the field flux must be increased. This can only be done by increasing the field excitation or field current.

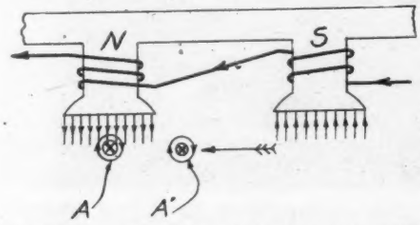


Fig. 2.—Diagram Showing a Development of Fig. 1.

Conversely, if the field excitation is arbitrarily increased the excess field flux must be beaten down, or reduced, so that the net field, Q, is still the same. This can only be done by a leading current in the armature of sufficient magnitude to neutralize the excess of Q over that corresponding to normal conditions where $E = Q \times N \times n$. In other words, the leading current is produced by the necessity of maintaining Q practically constant. This leading current must be drawn from the line, and under these conditions there results an over-excited synchronous motor drawing leading current from the supply and so acting like a condenser.—I. W. G., New York City.

BOOK REVIEWS

"Handbook for Electrical Engineers." By Harold Pender, New York: John Wiley & Sons, Inc. Cloth, 2023 pp. (4.25 ins. by 7 ins.) with many illustrations and tables. Supplied by Electrical Review Publishing Co., Inc.

This handbook has been prepared primarily for the practical engineer. All material has been arranged for easy location, and all theoretical discussions have been segregated into separate articles. In articles dealing with practical matters only enough is said of theory to indicate the general principle of which the matter in hand may be a specific application. Although prepared for electrical engineers, the handbook is so arranged and includes such information as to be valuable to mechanical, civil and mining engineers and others.

A large amount of space is devoted to mechanical and civil engineering problems that are somewhat related to electrical engineering work. Numerous mathematical relations and tables such as logarithms, trigonometric tables, hyperbolic functions, exponential functions, derivatives, integrals, indeterminate forms, etc., are given.

One of the features of this work is the arrangement of material, all subjects being laid out in alphabetical order. The first article deals with abbreviations and the last one with X-rays. Between these two articles is presented a clear and concise treatment of matters of all kinds pertaining to or related to the electrical science.

The paper and printing are good, the illustrations are clear and well chosen, considerable pains having been taken to prepare a truly useful book.

"House Wiring." (Third edition.) By Thomas W. Poppe, New York: The Norman W. Henley Publishing Co. Flexible cloth, 208 pp. (6 ins. by 4 ins.) with 160 illustrations. Supplied by Electrical Review Publishing Co., Inc., for $1.

This book is prepared primarily for those persons who are desirous of obtaining a practical knowledge of the installation of electric lighting and power systems. Only practical examples of work are included, and the author has treated the subject in a clear, non-technical manner, easily understood by the reader. Throughout the book the various illustrations help to make clear the different operations described.

This work will prove of special value to apprentices, helpers and electricians. The advanced electrical worker will also find many things to interest him, as many labor and time-saving operations and diagrams are illustrated and described.

The addition of the chapters on telephone wiring, wiring in concrete construction, conduit bending and motor wiring add to the value of the present edition. Separate chapters deal with plans and layouts of electrical work, flexible metallic wiring systems, rigid conduit, combining flexible and rigid conduit, wiring and switch diagrams, grounding conduit systems, knob and tube work, bell wiring and appliances, burglar-alarm wiring, telephone wiring, conduit bending, wiring in concrete construction, d-c. motor connections, and motor wiring.

Illustrations and descriptive matter show house-wiring plans, various pieces of equipment, methods of doing ordinary work, the method of controlling lamps from one, two, three or more locations, wiring for intercommunicating telephone systems, etc.

"Electrical Trades Directory and Handbook, 1920, The Blue Book," British, (38th edition.) London: Benn Brothers, Ltd., 8 Bouverie St., E. C. 4. Cloth, 1445 pp. (6 ins. by 9¼ ins.). Supplied by Electrical Review Publishing Co., Inc.

This volume is a complete directory of the electrical industry in Great Britain and an abbreviated directory of the industry in British possessions and Asia, Africa, Europe, Central and South America, and the United States. The section devoted to Britain contains 1266 pp. A section is devoted to the colonies and another to the foreign or continental countries. The British section contains three general subdivisions, one devoted to the handbook, another to the alphabetical directory, and the third to the classified directory. In the handbook is contained such matter as patent law, tabular matter used by the industry, testing rules, custom duties, international telegraph agreements and rules, British societies, colleges, officials of electrical organizations, digest of laws and ordinances affecting the industry, wiring rules, etc. One of the important but minor features is the portion showing the standard symbols for switches and connections, and for miscellaneous gear and parts of machines, and the symbol letters for instruments. The section devoted to the United States contains an alphabetical and a classified directory of engineers and manufacturers.

"A Course in Electrical Engineering, Volume 1, Direct Currents." (First edition.) By Chester L. Dawes. New York: McGraw-Hill Book Co., Inc. Cloth, 496 pp. (5½ ins. by 8 ins.), profusely illustrated. Supplied by Electrical Review Publishing Co., Inc.

This book is prepared specifically as a text on electrical engineering. Naturally it is a treatment of direct currents, being the first volume of a two-volume series. The fourteen chapters contain material beginning with the theory of magnetism and ending with power distribution. The subjects considered in the intermediate chapters are, in order, electromagnetism, resistance, Ohm's law and the electric circuits, battery electromotive forces, primary and secondary batteries, electrical instruments and measurements, the magnetic circuit, electrostatics and capacitance, generators, generator characteristics, motors and losses and operation.

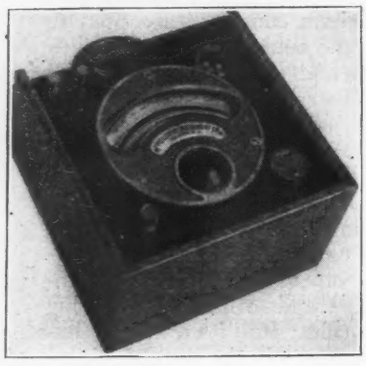
The book is peculiarly free from confusing formulas and is, in consequence, adapted to beginners and others who have not had training in calculus. The necessary formulas are developed from the definitions of the laws of magnetism. Throughout the book considerable space is allotted to the application of theory to actual conditions encountered by the practical man. An appendix contains nearly 500 problems to be solved.

NEW APPLIANCES

Newly Developed and Improved Electrical and Mechanical Apparatus, Appliances, and Devices Now Being Placed on the Market

Portable Potentiometer-Type Low-Voltage Meter.

In testing practice and routine maintenance work the four chief requisites of the electrical equipment used are simplicity, ruggedness, accuracy and portability. The "Millivolter," being marketed by the Pyrolectric Instrument Co., Trenton, N. J., was developed to



View Showing the Case, Scale and Regulating Devices of the "Millivolter."

supply the need for a self-contained and sturdy precision meter which would measure potentials up to one volt on the potentiometer principle, and with a minimum amount of manipulation.

The "Millivolter" is an instrument for measuring voltages without drawing any current from the source being measured at the time the measurement is taken. The voltage being measured is opposed by a voltage obtained from a dry cell, the instrument voltage being regulated by resistances. When the two voltages are equal, as indicated by reading of the instrument, a button is pressed and the current flowing in the standard resistance is measured. The instrument scale is so marked that the instrument indicates directly in millivolts the voltage between the two points to which the meter terminals are applied. This instrument does not require the use of a standard cell and is guaranteed to be accurate within 0.2% of full scale reading.

As may be noted from the illustration, there are but three adjusting devices to manipulate. The small switch in the upper right hand corner controls the range. It is provided with three clearly marked points giving ranges of 0 to 10, 0 to 100, and 0 to 1000 millivolts. The knob in the lower right-hand corner controls, by means of a rheostat, the voltage opposing the unknown voltage. The button in the lower left-hand corner controls the meter. When this button is up the meter indicates the state of balance existing between the unknown voltage and the internal voltage of the instrument. When this button is depressed the meter indicates the value of the unknown voltage, provided a balance was obtained at the time it was depressed. An instrument of this type is useful in meter testing, armature testing, current measurement and in a great variety of places where the ordinary millivoltmeter has been used in the past.

Two-in-One Double-Service Plug.

The Union Appliances Co., 103 Mott street, New York City, has placed on the market a new type of double-service plug. The device consists of one standard Edison-base plug and two standard receptacles. It is made of fiber throughout, with the exception of the current-carrying parts, and has a rating of 660 watts.

Renewable Electric Fuse.

A type of fuse plug, said to be quickly renewable, is being placed on the market by the Ree-Nu-It Electric Manufacturing Co., New Bedford, Mass. The fuse wire runs diagonally through the plug, being held between washers and a nut at the top and by a wedge button at the bottom.

To make the renewal, the fiber top is unscrewed and the brass nut loosened sufficiently to remove the end of the burned-out fuse. The bottom end of the old fuse is removed by simply taking out the wedge button. Inserting new fuse wire is the next step and then the brass nut is tightened and the wedge button inserted again. The fiber top is screwed on and the plug is ready for use without further adjustment.

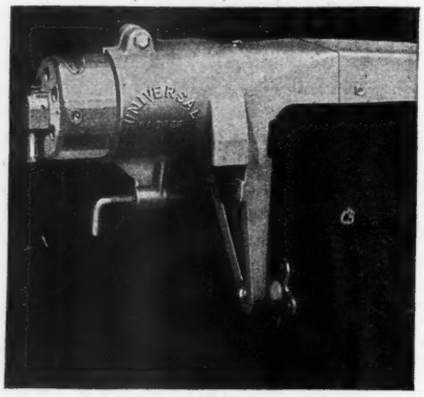
Extension-Arm Electric Washing Machine.

Simplicity of construction, portable adaptation of the washing unit and a retail price little more than one-third that of other machines for the same

"Universal" Electric Clothes Washer.

purpose, are features of the "Universal" electric clothes washer now being placed on the market by the Universal Utilities Corp., Alpena, Mich. This machine is all metal, the regular tub and cover supplied with the machine being of rust-proof galvanized iron. The washing unit, which consists of universal motor, adjustable extension arm and perforated one-way cylinder with baffles, may be taken out of its tub and adjusted to fit in any standard size of stationary laundry tub or in the bathtub.

The zinc cylinder contains 2918 cu.



Motor and Extension Arm of "Universal" Clothes Washer.

ins. of washing space, and is designed to wash six sheets or their equivalent. The machine, including the motor, weighs but 51 lbs., and may be stowed away in a closet or under the sink or kitchen table. When so specified, a specially designed motor is provided that will operate with a 32-volt private lighting plant.

"Harco" Lineman's Safety Blanket.

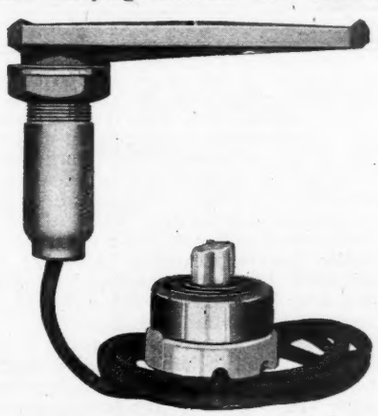
For use of linemen working near live wires, a safety blanket has been developed by F. A. Hardy & Co., Chicago. It is composed of two thicknesses of steam-cured rubber between which fabric is inserted, the materials being vulcanized together in one solid sheet, 1/16 in. thick and 36 ins. square. The edges are heavily beaded so that the blanket may be held in place on wires by wooden clips. The blanket is pliable and can be carried under the workman's belt.

Immersion Heater Protected by Brass Casting.

The immersion-type water heater, shown in the accompanying illustration, consists of nickel-chromium heating elements incased for protection in a flat brass casting. This casting is about 3 ins. by 6 ins. by 0.5 in. in size, and makes a simple and durable heater which is easily cleaned of sediment that may be deposited from the water. When protected in this manner the life of the heating element is increased, requiring less frequent re-

newals than with the ordinary immersion-type heater, so the manufacturer states. This heater is well adapted for use with sterilizers, glue pots, paste kettles, stills, etc.

Projecting at right angles from one end of the casting is a hollow extension carrying locknuts and washers



Immersion-Type Electric Water Heater.

and through which runs the extension cord.

To install the heater, a 1¼-in. hole is drilled through the bottom of the container, and the heater is then inserted from the top. The extension through which the cord is run projects downward through the hole Tightening the nuts and washers holds the heater rigid and prevents leakage.

By means of a snap switch on the heater cord heats of 1200 watts, 600 watts and 300 watts may be obtained. If more than 1200-watts capacity is desired, two or more heaters may be used in the same container. Standard heaters are made for 110, 120 and 220 volts, and may be used on d-c. or a-c. circuits. The heaters are manufactured by the Cutler Hammer Manufacturing Co. of Milwaukee and New York.

The "Triplex" Fan and Heater.

An interesting development in electric radiators has just been announced by the Thermo-Fan Electric Co., Inc., who have placed on the market a combined fan and heater called the

Electric Heater and Fan in a Single Unit.

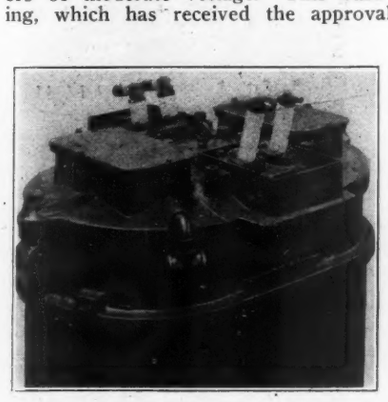
"Triplex." A special nichrome heater coil is attached to the guard of a standard electric fan, and the operation of the "Triplex" blows the air of the room through the coil, heating it and circulating it through the room.

This device provides a source of heat that does not merely warm a corner, and it is not necessary to sit in front of it to feel the heat. It actively warms the air of the room by raising the temperature of the air and distributing it thoroughly, according to the claims made. The "Triplex" attaches to any socket, plugged in with a current tap, giving independent connection to fan and heater. The fan and heater operating together consume 660 watts for the domestic size, other types having capacities in proportion.

The advantages of the "Triplex" are apparent. The domestic size, utilizing a 6-in. fan, provides an effective electric heater for auxiliary service. The fan operated with the heater turned off blows a strong cooling breeze, and the heated breeze is ideal for drying the hair, drying the clothes on wet wash days or for many other similar purposes. The "Triplex" in larger sizes is being made for drying photographic work, printing, oils, tobacco, spaghetti and in many other processes where a circulating heat is needed that is under absolute control. The S. O. S. Electric Sales Co. of 2 Columbus Circle, New York City, are general selling agents for this device.

Bushing With Housing for Outdoor Transformers.

The General Electric Co., Schenectady, N. Y., has developed a new type of bushing for outdoor-type transformers of moderate voltage. This bushing, which has received the approval



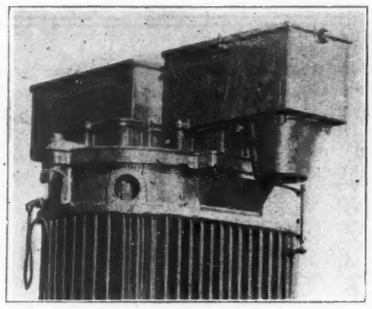
Bushing for Outdoor Transformers.

of the inspection department of the Associated Factory Mutual Fire Insurance Cos., should make it possible to dispense with transformer houses. These transformer houses are specified in some localities by insurance companies, their construction being determined by insurance requirements and safety considerations.

The scheme provides that all circuits, generally above 600 volts, be brought to the housing in inclosed cables. This cable is above ground in a metal duct which is securely fastened to the transformer cover, all exposed parts being at ground potential and waterproof. The waterproof feature is essential, from the Underwriter's standpoint, in making it safe for firemen to play streams on burning buildings near the transformers without danger.

Since the circuits to the transformer will generally consist of waterproof lead-covered cable, provision is made in the cutboard portion of the housing for inclosing a standard and bell corresponding to the circuit voltage.

The lower portion of the bushings is similar to the standard General Electric high-voltage bushing, while the upper portion is shown in the illustration. Ample clearance is provided in the housing. The transformers receive



Housing Over Transformer Bushings.

standard high-potential test with housings in position and without any taping or other insulation on the bushings. The use of these transformers is only limited, as regards voltage, by the voltage limits of the underground cable.

Another Series of Condulets.

To meet the demand for a condulet having an unusually long cover opening and big wiring chamber, the Crouse-Hinds Co., of Syracuse, N. Y., have designed a series known as the "Mogul" series of condulets which are shown in their Bulletin No. 1000 N. These condulets are designed to avoid kinking heavy wires or cables when pulling in or feeding through a conduit system, and to afford ample space for making splices or taps.

"Mogul" condulets, though liberal in their proportions, do not materially affect the general outline of the conduit system. Their hubs have integral bushings and tapered threads. Fastening screw holes are located at the ends of the cover openings. They are made in eight types, each type in eight conduit sizes ranging from 1 to 4 ins.

There are four sizes of composition

"Mogul" Condulet With Four-Hole Cover.

and cast-iron covers, each size being common to two sizes of "Mogul" condulet bodies. The composition covers are made with from one to nine wire holes; also blank, which can be drilled by the user as required. The cast iron covers

"Mogul" Condulet With Side Outlet.

are made in two types; with gasket, or without gasket. The gasket is made of round rubber, cemented into a groove in the cover. The cover-fastening screws are furnished with and secured to the cover.

LATEST APPROVED APPLIANCES

Approved by Underwriters' Laboratories, Following Examination and Tests Conducted Under the Standards of the National Electrical Code

Appliances, Resistance—Allen-Bradley Co., Milwaukee. Listed July 27, 1920.

Battery-charging rheostats for use in charging automobiles and signal batteries; Type L2120; size 2, 32 volts, 15 amperes; size 12, 115 volts, 15 amperes.

Fittings, Fixture—Chicago Electric Products Co., 4605 Ravenswood avenue, Chicago. Listed Aug. 20, 1920.

Insulating support for chain fixtures.

Fittings, Outlet—Utility Fittings Co., 812 Walnut street, Philadelphia. Listed Aug. 13, 1920.

"Utility" castiron fittings with two conduit entrances at right angles, having openings for drawing in wires with threaded closure cap; Type L, ½, ¾, 1, 1¼, 1½ and 2 ins.

Fittings, Vapor-Proof Fixture—V. V. Fittings Co., Philadelphia. Listed July 13, 1920.

Type 5, Series ALL, BLL, CLL, ELL, KLL, LLL, TLL, ULL, XLL, YLL, ALM, BLM, CLM, FLM, KLM, LLM, TLM, ULM, XLM, YLM, UM, YM, UML, YML.

Fixtures—Sampson Axcess System, Inc., 434 Union street, Lynn, Mass. Listed Aug. 10, 1920.

"Sampson Axcess System"; adjustable electric fixtures, ceiling type, for use only with portable flexible cord.

Fuses, Plug—Ward Electric Co., Philadelphia. Listed Aug. 13, 1920.

Edison plug fuses, 0.30 amperes, 125 volts.

Ground Clamps—Kirkman Engineering Co., 484 Broome street, New York City. Listed July 30, 1920.

"Kirkman" ground clamps for use with 3-in. rigid conduit or less.

Heaters, Car—Consolidated Car Heating Co., Albany, N. Y. Listed July 22, 1920.

Consisting of heating units mounted in perforated sheet-metal cases; cross seat heaters, catalog Nos. 1112-JL, 1112-JT, 1112-JK, 1118-JL, 1118-JT, 1118-JK; longitudinal seat heaters, catalog Nos. 1118-JL, 1118-JT, 1118-JK, 1124-JL, 1124-JT, 1124-JK, 1218-JL, 1218-JT, 1218-JK, 1224-JL, 1224-JT, 1224-JK; cross-seat car heaters with tilting heat deflectors; cross and longitudinal seat heaters with 3-in. hangers, to be used only when under side of seat is protected by fire-resisting, insulating material not less than ¼-in. thick or by 0.04-in. sheet-metal with 1-in. air space over same.

Heaters, Curling Iron—American Electrical Heater Co., Woodward, Burroughs and Cass avenues, Detroit. Listed Aug. 3, 1920.

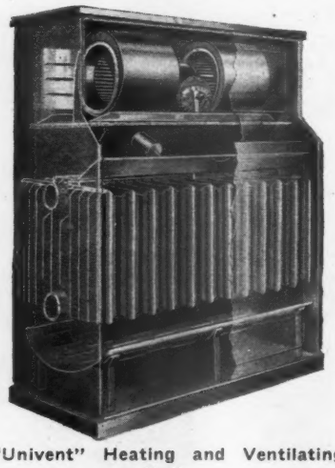
For 90 watts; catalog Nos. 111-13, 115-17 and 601.

Heating Appliances, Industrial and Laboratory—Prometheus Electric Co., 511 West 42nd street, New York City. Listed Aug. 3, 1920.

Electric heaters, 110-250 volts, with fusible members designed to open circuit in event of abnormally high temperature resulting from absence of liquid; sterilizers, dental and surgical, maximum watts 750-950; Type Nos. 520, 523, 526.

Heating and Ventilating Units—Moline Heat Co., Moline, Ill. Listed Aug. 6, 1920.

"Univent;" consisting of metal cabinet inclosing low-pressure steam radiator containing direct-connected,



"Univent" Heating and Ventilating Unit.

motor-driven air blower; to be installed at windows or wall openings for drawing air either from room after, or without passing it through radiator; motor rating 1/6 hp., 110 volts direct current.

Lamp Adjusters—Anderson Electric & Equipment Co., 154 Whiting street, Chicago. Listed Aug. 13, 1920.

"Reelite" automatic lamp adjuster; catalog Nos. 1523, 1528 and 1529.

Outlet Plates—National Metal Molding Co., Fulton building, Pittsburgh. Listed July 20, 1920.

"National" steel and castiron outlet plates; catalog Nos. 2360-62.

Receptacles for Attachment Plugs and Plugs—Bryant Electric Co., Bridgeport, Conn. Listed June 4, 1920.

"Bryant" and "Perkins"; Combination for use on ranges, consisting of porcelain base provided with receptacles for two plug-type fuses and attachment plug cap; 10 amperes, 125 volts; catalog No. 136. Heater control combination consisting of assembly of two or more of following parts mounted on single porcelain base for attachment plug, indicator-lamp or receptacle, and switch; 660 watts, 125 volts, catalog No. 437; 5 amperes, 250 volts; Spartan, catalog No. 117; 10 amperes, 125 volts, catalog Nos. 398, 413, 419, 438, 465, 467, 469, 495, 514-15 and 518; Spartan, catalog Nos. 121 and 558; 10 amperes, 250 volts, catalog No. 466; 25 amperes, 250 volts, catalog No. 439. Switches for use with above devices are standard and labeled.

Receptacles for Attachment Plugs and Plugs—Universal Electric Stage Lighting Co., 420 West 50th street, New York City. Listed July 30, 1920.

"Kliegel;" 100 amperes, 250 volts; catalog No. 1310.

Receptacles, Medium Size—National Metal Molding Co., 1110 Fulton building, Pittsburgh. Listed Aug. 6, 1920.

"National" porcelain shell; keyless, catalog No. 5500.

Rectifier—St. Louis Electrical Works, 4060 Forest Park boulevard, St. Louis. Listed June 29, 1920.

Vibrating rectifier for charging small storage batteries from a-c. supply lines; 60 or 25 cycles, a-c; 6-12 volts, 6-3 amperes d-c., Type MC.

Switches, Push Flush—Ward Electric Co., 1411 Walnut street, Philadelphia. Listed July 27, 1920.

"Ward" single-pole; catalog No. 5001.

Switches, Push and Rotary Flush—Hart & Hegeman Manufacturing Co., 342 Capitol avenue, Hartford, Conn. Listed July 26, 1920.

"H. & H." double-pole, catalog Nos. 3248, 3522, 3778 and 3778-L; four-way, catalog No. 2264; electrolier, catalog Nos. 3511-13; remote control, 6 amperes, 250 volts, catalog Nos. 2061-L, 2179-L, 3540, 3660, 3660-L, 3661 and 3661-L.

Switches, Surface—Hart & Hegeman Manufacturing Co., 342 Capitol avenue, Hartford, Conn. Listed July 27, 1920.

"H. & H." ceiling switches; pull, single-pole; catalog Nos. 3741-42; double-pole, catalog Nos. 3743-44; three-way, catalog Nos. 3745-46; two-circuit, catalog Nos. 3747-48; three-cidcuit, catalog Nos. 3749-50.

Heaters, Air—American Electrical Heater Co., Woodward, Burroughs and Cass avenues, Detroit. Listed Aug. 3, 1920.

"American Beauty Quad Radiant" air heater; 1320 watts, 250 volts or less; catalog No. 6224.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

The K. W. Battery Co. has leased a building at 514 West Fifty-third street, New York City, for a new local works.

Welch Armature Co., Welch, W. Va., plans to erect an electrical machinery and repair plant, 50 by 90 ft., to cost $25,000.

Newark Electrical Co., Newark, N. J. has filed plans for improvements and extensions at its establishment at 223 Market street.

Rumsey Electric Co., Philadelphia, has removed its works from 1231 Arch street to 1007 Arch street, for increased facilities.

Whalen Electric Co., 25 High street, Pawtucket, R. I., will install a new lighting system in the Cole block on Main street.

Luthy Battery Co., Berkeley, Cal. of which W. O. Denny is vice president, plans to erect a plant for the manufacture of batteries on the Pacific Coast.

Western Electric Co. is negotiating for a building for the establishment of a branch works at Baltimore. The proposed plant will comprise about 30,000 sq. ft. of space.

Clarksdale Machinery & Supply Manufacturing Co., Clarksdale, Miss., plans to erect a building to be used as electrical shop. J. H. Hooks is manager of the company.

Victor Electric Co., 116-20 West Thirty-second street, New York City, is arranging for a consolidation of its interests with the X-Ray Supply Co. Edwin W. Kelly is secretary.

Litscher Lite Corp., Grand Rapids, Mich., has increased its capital stock from $1,500,000 to $5,500,000. The company manufactures storage batteries and other electrical equipment.

Bowers & Bartlett, Inc., 512 Twelfth street, N. W., Washington, D. C., has been organized to manufacture a patented electric washing machine. The company plans to operate a factory at Hyattsville, Md.

Aetna Electric Appliance Co., Boston, in its August bulletin illustrates and describes a model installation of its "Hotvent" water heater, which is adapted to regular or automatic control by time switch.

M. B. Austin Co., Chicago, manufacturer of conduit fittings, wiring devices, etc., is erecting a plant at 108 South Desplaines street at a cost of about $150,000. The building will be three stories in height, with a floor space of 30,000 sq. ft.

Hercules Manufacturing Co., Indianapolis, Ind., has taken over the business of the Hercules Electric Co., manufacturer of Wizard magnetos. The former company was recently organized with a capital of $400,000, those interested being Charles G. McCutcheon, C. D. Meier, B. Perry Remy and Frank I. Remy.

National Fibre & Insulation Co., Yorklyn, Del., manufacturer of electrical insulation products, has increased its capital from $500,000 to $3,000,000, for proposed expansion.

Driver-Harris Co., Middlesex avenue, Harrison, N. J., manufacturer of electrical wires, etc., has had plans prepared for the erection of two two-story additions to its plant, to cost about $80,000 and $40,000, respectively.

Meadows Manufacturing Co., Bloomington, Ill., manufacturer of power washers, etc., opened its new factory Aug. 19. The demand for the Meadows lines has increased to such an extent within the last few years that it was found necessary to enlarge the manufacturing facilities to take care of the business. The new plant

View In New Factory of Meadows Manufacturing Co.

occupies 15 acres of ground and is capable of giving from 400 to 500 per cent more production than the factory recently vacated. Production is rapidly increasing and although the volume of orders has exceeded the supply of Meadows goods, the output will soon be augmented so that new business can be handled promptly.

Electric Arc Cutter & Welding Co., manufacturer of "Alternarc" apparatus and electrode accessories and supplies, has reorganized and is now located at 152 Jeliff avenue, Newark, N. J. A. L. Livermore is president; A. D. T. Libby, secretary-treasurer; C. J. Holslag, chief engineer and general manager, and H. W. Livermore, assistant manager.

Ackurate Rubber Co., 253 Broadway, New York City, has been incorporated under New Jersey laws to manufacture insulating tapes, compounds and kindred specialties. Willard C. Candee, president, and Charles V. Ackerman, secretary-treasurer, have been identified with this branch of the electrical industry for over 20 years. The Ackerman friction tape, manufactured by the company, is put up in paper cartons, which is something of a novelty to the trade. The New York City trade is being handled direct by the company, which will establish agencies in the principal cities throughout the United States.

Wheeler Condenser & Engineering Co., Carteret, N. J., manufacturer of condensers, pumps and other power plant equipment, has increased its capital to $1,500,000 preferred stock, and 10,000 shares of common stock, no par value, for expansion.

Edison Lamp Works of General Electric Co., 165 Broadway, New York City, is completing plans for the erection of an addition to the local building at Scranton, Pa., recently acquired for a new lamp works. The structure with equipment is estimated to cost about $200,000.

Electric Storage Battery Co., Nineteenth and Allegheny streets, Philadelphia, has leased property at 222-32 East Fifty-fifth street, New York City, for the erection of a two-story service works for its Exide Battery Depots, Inc. The company will also establish a similar plant at Spring and Clark streets.

Drendell Electrical & Manufacturing Co., San Francisco, has made some changes in its personnel, A. E. Drendell, former president, having disposed of his interest to J. Gensler and L. Siebert, who plan to continue the business in a new factory at 1345 Howard street. The new officers of the company are J. Gensler, president, and L. Siebert, secretary-treasurer.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., is distributing circular No. 7132, on electrification of excavating shovels, which describes and illustrates the various uses to which electric shovels may be put, such as railway work, coal mining, and dragline excavating. The method of electrifying is discussed, together with an outline of the choice of equipment. Advantages of electric shovels are fully considered and results of recent tests are given, which show the cost per cubic yard of material removed by means of these shovels. Tables are produced which show the approximate energy consumption of electric shovels and dragline excavators.

Blaw-Knox Co., Pittsburgh, has presented its employes with life insurance as an evidence of the company's appreciation of the value of loyalty, co-operation and continued service. All employes with not less than three months' service are insured for $500; those with the company from six months to one year, $750; from one to two years, $1000; thereafter with each additional year's service the insurance is increased by $250, until a maximum of $2000 is reached. New employes are entitled to participate in the benefits of the plan after three months' continuous employment. The insurance remains in force without expense of any kind to the individual covered as long as the employe continues with the company, the entire cost being borne by the Blaw-Knox Co.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

W. N. DICKINSON, consulting engineer, has been elected president of the New York Electrical Society.

W. D. ALDERSON has been appointed director of industrial relations of the Union Electric Light & Power Co., St. Louis.

A. B. KREITZBURG has been appointed manager of the advertising department of the Electric Storage Battery Co., Philadelphia.

J. C. PARMELY, formerly with the Okmulgee (Okla.) Ice & Light Co., is now with the Milwaukee Electric Railway & Light Co., Milwaukee, Wis.

J. A. WHITLOW, formerly manager of the Pine Bluff Co., Pine Bluff, Ark., has been apopinted traffic manager of the Arkansas Light & Power Co.

GERARDO IMMEDIATO has accepted a position with the Polytechnic Institute of Brooklyn, N. Y., as professor in charge of machine and power-plant design.

LESTER G. MAMPLE has been appointed assistant sales manager of the Northwestern Electric Equipment Co., St. Paul, Minn. He was formerly city salesman for the company.

F. M. WILKES has been appointed operating superintendent of the Arkansas Light & Power Co., Arkadelphia, Ark. He was formerly commercial manager of the company.

C. B. LORD has resigned as general superintendent of the Wagner Electric & Manufacturing Co., St. Louis, to become works manager of the Advance-Rumely Co., Battle Creek, Mich.

E. A. HITCHCOCK has resigned as vice-president of the Bailey Meter Co., Cleveland, following his appointment as dean of the Engineering College of the Ohio State University, Columbus.

T. N. CHARLES, formerly signal and electrical supervisor of the Southern Railway's western lines, has been appointed signal and electrical inspector, with headquarters at Washington, D. C., to succeed L. C. Walters.

DR. C. H. REED has been appointed manager of the publication division of the Electric Storage Battery Co., Philadelphia, having charge of the production and distribution of all printed matter sent out by the company.

J. L. LONGINO has been appointed manager of the Pine Bluff Co., Pine Bluff, Ark., operator of electric light, street railway and water properties. He was formerly superintendent of the Arkansas Light & Power Co. properties.

L. T. ROBINSON, in charge of the standardizing laboratories of the General Electric Co., Schenectady, N. Y., since 1904, has succeeded Wilfred Sykes as chairman of the board's committee on technical activities of the American Institute of Electrical Engineers.

H. P. LIVERSIDGE has been appointed chairman of the power stations committee of the American Institute of Electrical Engineers to succeed Philip Torchio. Mr. Liversidge is assistant chief engineer of the Philadelphia Electric Co.

A. C. STREAMER, manager of the switchboard section supply department, Westinghouse Electric & Manufacturing Co., has been appointed industrial

A. C. Streamer.

assistant to the manager of the supply department, with headquarters at East Pittsburgh, Pa. Mr. Streamer was born in the West and graduated from the Colorado State University in 1907, when he entered the graduate students' course at East Pittsburgh. After spending several months in the shop on test and manufacturing work, he joined the switchboard engineering department, where he spent some time on design. About five years ago Mr. Streamer was appointed manager of the switchboard section of the supply department, which position he has held until the present time.

FRANK M. TOBIN has been appointed division traffic engineer at Washington, D. C., for the Chesapeake & Potomac Telephone Co. Heretofore he was engaged as engineering assistant H. L. Warner, traffic supervisor, has been advanced to division employment manager, Washington traffic.

HERBERT A. BARRE has been appointed executive engineer of the Southern California Edison Co., Los Angeles, Cal. He is active in the affairs of the American Institute of Electrical Engineers and the National Electric Light Association, being at present first vice-chairman of the hydroelectric and technical committee of the N. E. L. A.

GRAHAM BRIGHT, engineer of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has been appointed chairman of the mine committee of the American Institute of Electrical Engineers to succeed W. A. Chandler.

PHILIP TORCHIO, electrical engineer of the New York Edison Co., has been appointed chairman of the technical committee on economics of electric service of the American Institute of Electrical Engineers to succeed C. S. Ruffner.

OBITUARY.

EDWARD A. MAHER, former president of the Union Railway Co. and the Third Avenue Railway Co., died Sept. 13 in his home, 345 West 88th street, New York City. He was born in Albany, N. Y., 72 years ago and was mayor of that city in 1888 and 1889. In the following year he went to New York City as president of the Union Railway Co., which positoin he held until Jan. 1, 1918, when he was succeeded by his son, Edward A. Maher, Jr., who in turn resigned Jan. 2, 1920, to resume law practice.

PROF. JOHN PERRY died last month in London, England, at the age of 70 years. He was a past-president of the Institution of Electrical Engineers and of the Physical Society, and treasurer of the British Association. Professors Perry and Ayrton were pioneers in the development of electrical instruments and they have been credited with the invention of the first motor meter placed on the market in Great Britain. The multipolar dynamos introduced in 1882 are among the inventions brought out by these two men. Many of the lectures and addresses of Professor Perry before the British engineering societies and technical colleges have been published in book form, among which are "Steam, Gas and Oil Engines," "The Calculus for Engineers," and "Applied Mechanics."

DR. SAMUEL SHELDON died Sept. 5, aged 58 years. He was born at Middlebury, Vt., and graduated from Middlebury College in 1883, remaining there two years as instructor in mathematics. In 1889 he was appointed to the chair of physics and electrical engineering at the Polytechnic Institute of Brooklyn, which position he held at the time of his death. Dr. Sheldon was a member of the American Institute of Electrical Engineers, New York Electrical Society, American Electrochemical Society, American Electric Railway Association, American Electro-Therapeutic Association and many other organizations. He was well known as an experimental physicist, electrical engineer and scientific writer, being the author of "Alternating-Current Machines," "Dynamo-Electric Machinery," "Electric Traction and Transmission Engineering," etc.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Skowhegan, Me. — The Central Maine Power Co., Water street, Augusta, is planning the construction of a hydroelectric power plant here to cost in excess of $1,000,000, including equipment. F. H. Mason is chief engineer.

Poultney, Vt.—The S. S. Sherman Milling Co. will operate its entire plant with electric power and necessary equipment will be installed at once. Service will be rendered by the Vermont Hydroelectric Co.

Boston, Mass.—The Eastern Utilities Corp. has been organized with a capital of $50,000 to operate electric and other utilities in this section. Incorporators: Tobias Foss, David L. Dailey, Lynn; and Frank L. Baker, Dorchester.

Brookline, Mass.—The New England Telephone & Telegraph Co., Boston, will make extensions and improvements in its local exchange building to cost about $35,000.

Fall River, Mass.—A power plant for general factory service will be erected by the American Printing Co., 56 Water street, in connection with the construction of extensions at its textile works. The expansion is estimated to cost $150,000.

Fall River, Mass.—An electrically operated pumping plant and other electrical and mechanical equipment will be installed in the local oil plant to be constructed by the New England Oil Corp., at an estimated cost of $3,000,000.

Holyoke, Mass.—Electrical and mechanical equipment will be installed in the proposed new local paper mill to be erected by the Perfect Safety Paper Co. The plant is estimated to cost $75,000. Howes & Howes, 319 High street, are architects.

Maynard, Mass.—The Concord, Maynard & Hudson Street Railway Co. is considering a proposition for the securing of electric power from the Connecticut River Power Co., eliminating its present individually operated station.

Middletown, Conn.—The board of directors, Weslyan University, will make extensions and improvements in the power house at the institution to cost about $30,000.

New Haven, Conn.—The United States Rubber Co. is making improvements and extensions in its power house on Chapel street. A brick stack, 175 ft. high, will be erected at a cost of $12,000.

Albany, N. Y.—The Standard Oil Co. has awarded a contract to H. D. Best & Co., 949 Broadway, New York City, for the erection of a power house at its property on Waterloo Island, near Albany.

Buffalo, N. Y.—George Bullock, Erie, Pa., receiver for the Buffalo & Lake Erie Traction Co., is arranging for the sale of the property of the company located in New York state, including power plants, substations, car houses, shops, etc.

Buffalo, N. Y.—The Standard Oil Co., 1103 Elk avenue, plans to erect a two-story power plant, 52 by 200 ft., at an estimated cost of $150,000.

Buffalo, N. Y.—Considerable electrical and mechanical equipment will be installed by the Drumstra Ice Cream Co., 958 Fillmore avenue, in its proposed plant to be erected at Bailey avenue and Broadway at a cost of $75,000.

Freeport, N. Y.—A bond issue of $78,000 has been sold, the proceeds from which are to be used to build electric light and water plant. Address town clerk.

Lancaster, N. Y.—The Depew & Lancaster Light, Power & Conduit Co. has construction under way on a one-story building here, 32 by 90 ft., to cost about $10,000.

Ledyard, N. Y.—The Ledyard Lighting Co. has been incorporated with a capital of $25,000 to operate a local electric light and power system. Incorporators: S. F. Hancock, M. S. Melvin and W. B. Mangin, Syracuse.

Long Island City, N. Y. — The Standard Oil Co., 26 Broadway, will make improvements and extensions in its power house here on Ninth street.

New York, N. Y.—The American Telephone & Telegraph Co. has leased property at 2 East 28th street, to be used in connection with local operations.

Niagara Falls, N. Y.—The United States Light & Heat Corporation, manufacturer of storage batteries, lighting equipment, etc., has filed plans for the erection of a new plant addition, 25 by 50 ft.

Medina, N. Y.—The Western New York Utilities Co. has made application to the Public Service Commission for permission to build an addition to its electric plant at Gaines, N. Y. A. L. Sweet is president.

North Tonawanda, N. Y.—The Tonawanda Power Co. is planning the operation of its new substation on Robinson street, now in course of erection, early in October. The plant will have a capacity of 10,000 hp., and will represent an investment of about $160,000. It will double the present local output of the company. It is planned to continue the former electric substation at this place in service.

Pelham, N. Y.—The Westchester Lighting Co., First avenue, Mount Vernon, has filed plans for the erection of an addition to its local station.

Rossie, N. Y.—G. N. Wilson, Rossie, has received permission from the Public Service Commission to build a new electric light and power plant at Hammond.

Syracuse, N. Y.—Tomkins Brothers, South Clinton street, have completed plans for the erection of a one-story power plant, 30 by 50 ft., on Oneida street, for industrial service.

Yonkers, N. Y.—The Yonkers Electric Light & Power Co., 9 Manor House square, has awarded a contract to W. Young & Co., 414 West Forty-first street, New York City, for the erection of its proposed one-story electric substation, to cost about $75,000.

Atlantic City, N. J.—Electrical and mechanical equipment will be installed in the one-story ice manufacturing plant to be erected by the Hygenic Ice Co., 223 North Connecticut avenue, to be 53 by 200 ft., located on New Jersey avenue.

Bordentown, N. J.—The city commissioners have completed plans for the installation of a police signal system on Farnsworth avenue, Crosswicks street, and other thoroughfares.

Hightstown, N. J.—Electrical and mechanical equipment will be installed by the borough council at the municipal waterworks, in connection with extensions and improvements in the plant and system, estimated to cost $70,000.

Newark, N. J.—The Amalgamated Dye Stuff & Chemical Co., will build a power house at its plant on Plum Point lane.

Newark, N. J.—The city commission has adopted a resolution authorizing a referendum at the coming general election in November for a vote of citizens on a proposition for the municipality to construct and operate an electric power plant for municipal service in connection with the city watersheds.

Trenton, N. J.—The board of commissioners is planning for the early installation of new lighting facilities for the proposed improved system for the city; the plan covers a temporary arrangement and is estimated to cost $38,000. At a later date it is planned to inaugurate work on an extensive underground conduit system, as recommended by Professor Clewell, lighting expert for the municipality. This project, under present prices, would cost about $700,000.

Trenton, N. J.—The Public Utilities Commission has approved the application of the Trenton and Mercer County Traction Corp. for the conveyance of a right-of-way to the Borough of Princeton.

West New York, N. J.—The Golzman Silk Manufacturing Co., has filed plans for the erection of a power plant at its factory.

Woodbury, N. J.—The city council

is considering a tentative plan covering the erection and operation of a municipal electric light and power plant.

Allentown, Pa.—Electrical and mechanical equipment will be installed by the Allentown Rapid Service Co., at its ice-manufacturing plant now in course of construction at Seventeenth street and Summer avenue.

Juniata, Pa. — The recently organized McAllisterville Electric Co., McAllisterville, has made application for a state charter, and for permission to establish and operate an electric plant in certain districts of Juniata county.

Marcus Hook, Pa.—The Viscose Co. has begun the construction of a three-story power plant at its works, 53 by 108 ft.

Philadelphia, Pa.—The Pennsylvania Railroad Co., Broad Street station, has completed plans for the erection of an electric substation on Thirteenth, near South street, to cost about $38,000. Plans have been filed and erection permit issued.

Philadelphia, Pa.—The Carver File Co., Tacony and Backius streets, has filed plans for the erection of a power house at its plant to cost about $15,000.

Philadelphia, Pa.—The bureau of recreation has arranged for the installation of an electric lighting system on the public playground at Front and Allen streets. W. D. Champlin is secretary.

Philadelphia, Pa. — Electrical and mechanical equipment, including cranes, hoists, conveying apparatus, etc., will be installed by the Department of Wharves, Docks & Ferries in connection with port improvements. A number of new piers and warehouses will be constructed at different points on the Delaware river, with total estimated cost of the project placed at $20,000,000. George F. Sproule is director.

Philadelphia, Pa.—The Philadelphia Electric Co. is planning to place a section of its new generating station, now in course of erection at Beach and Palmer streets, in service late in October, covering production to the extent of about 60,000 kw. This is approximately one-half the designed output of the plant. The new station as planned was estimated to cost about $7,500,000, but with the increased cost of materials and labor it is said that the investment will be nearly $10,000,000.

Philadelphia, Pa.—Stockholders of the Philadelphia Electric Co. have approved plans for the issuance of $15,000,000 preferred stock, the proceeds to be used in part for proposed extensions and betterments in power plants and electric system.

Pittsburgh, Pa.—The Monongahela Valley Traction Co. has been granted permisison by the local government engineers to construct a transmission line across the Monongahela river, from a point near Lock 4, 68 miles above the mouth of the river to Fairmont, W. Va., for power supply for this section. It will be three-phase, 22,000 volts.

Pittsburgh, Pa. — The Highland Township Electric Corp. has been organized with a capital of $5000 to operate an electric system in Highland township. G. E. Murrie, Knoxville, Pa., treasurer.

Riddlesburg, Pa.—The Broad Top Power Co. has plans under way for the construction of a local power plant to cost about $500,000, including equipment.

Baltimore, Md.—The Consolidated Gas, Electric Light & Power Co., Lexington building, has filed plans for a one-story building on Constitution street. It is said that the company will soon call for bids for the erection of its proposed electric power plant at Dundalk, Md., near Baltimore, covering the first plant unit.

Baltimore, Md. — The Chesapeake & Potomac Telephone Co. is planning for extensions and improvements in its local exchanges and system to cost about $3,000,000, including neighboring counties. The work will comprise the installation of a new automatic exchange plant at Baltimore. Throughout its entire system, the company has arranged a program for extensions and betterments calling for an expenditure of $10,000,000 in the next 36 months.

Baltimore, Md.—The Miller Safe Co., Fremont street, will build a power plant for works service in connection with its factory now in course of erection at Wilkins avenue and Catherine street, estimated to cost $300,000. The company is a subsidiary of the York (Pa.) Safe & Lock Co.

Baltimore, Md.—The Delion Tire & Rubber Co., 131 Mount Royal avenue, will install new electrical and mechanical equipment in the proposed addition to be erected at the plant of the Dreadnaught Tire & Rubber Co., Orangeville, near Baltimore, recently acquired. The company has five acres of ground adjoining the present plant for expansion.

Bristol, Va.—Merger plans are under way between the Bristol Telephone Co. and the Cumberland Telephone Co., operating in this district. It is understood that the consolidated company will take the name of the first noted. The organization is planning for the installation of a new plant and system in this district, estimated to cost about $300,000. Albert Parlette heads the Bristol Telephone Co. at the present time, and, it is said, will be president of the new company.

South Boston, Va.—The South Boston Power Company., recently incorporated with a capital of $500,000, will operate a system in this section. T. C. Watkins, Jr., is president.

Unionville, Va.—The local telephone system, extending in Orange county, has been acquired by W. C. Newman, Unionville, at a public sale.

New Holland, N. C.—The North Carolina Farms Co. is planning the installation of an electric system in this district.

Charleston, S. C.—The Oceanic Power Co., recently incorporated, is planning the operation of a plant and system in this section. William Gregersen is president, and J. E. Martin, Jr., vice-president.

Sumter, S. C.—The Sumter Gas & Power Co., is planning enlargements in its plants for increased capacity. New equipment will be installed.

Toccoa, Ga.—The Toccoa Falls Light & Power Co. has acquired a 50-acre site in this district, and plans the construction of a hydroelectric power plant.

Delray, Fla.—The common council has approved plans for the purchase of equipment for a municipal electric lighting plant. Address W. A. Brennan, clerk.

Orlando, Fla.—The city has asked the Orlando Water & Light Co. to place a price on its two plants separately. For two years the company has been almost unable to keep up improvements and enlargements to meet the constantly increasing demands on the city's growth. Address D. A. Chaney, general manager.

Sanford, Fla.—The city commissioners and the Southern Utilities Co. will each pay half for the installation of a "white way" system.

Vero, Fla.—A contract has been awarded by the city council for an additional power unit to the municipal lighting plant, which will be placed in operation as soon as delivery can be made. The new unit consists of a 100-hp. oil engine and generator, and with equipment now in use will more than double the capacity of the plant.

NORTH CENTRAL STATES.

Carey, O.—Plans are being considered by the city council for the reconstruction of the distribution system. The project will include either a power plant or the erection of transmission lines. The estimated cost is $90,000. Address Froehlich & Emery, engineers, Toledo, O.

Cleveland, O.—The city will purchase wire, cables, transformers, meters and service equipment for the municipal electric light plant. The estimated cost is $100,000. Address G. Beckwith, City Hall.

Conneaut, O.—Plans have been prepared by V. Reading, architect, Bird building, Mansfield, O., for the erection of a $60,000 telephone exchange for the Conneaut Telephone Co.

Elyria, O.—Plans are being prepared for a one-story factory and power house, 118 by 180 ft., for the Reliance Crane Co. The estimated cost is $125,000.

Holland, Mich.—The citizens will vote on the question of issuing $244,000 in bonds to purchase gas plant. Address E. P. Stephan, mayor.

Jackson, Mich. — The Jaxon Steel Products Co. is erecting a power house, estimated to cost $20,000.

Traverse City, Mich. — The city commission has directed Burd & Giffel, Grand Rapids, to prepare plans for an electric power plant.

Anderson, Ind.—The petition of the city to issue $230,000 bonds for improvements to its electric light plant has been granted by the Public Service Commission of Indiana.

Kingsbury, Ind.—The Kingsbury Light & Power Co. will erect a $10,000 hydroelectric plant. Address R. L. Dobson.

Richmond, Ind.—The Board of Public Works plans to improve the municipal electric light and power

plant, bids for the work having already been received.

Athens, Ill.—The Athens Electric Co. will erect a transmission line from Athens to Indiana Point, thence to Fancy Prairie, thence to Cantrall and back to Athens. The company will supply light and power for the three towns.

Belvidere, Ill.—The council is considering ways and means to place the electric light and power wires in conduits. Address Mayor Dixon.

Bloomington, Ill. — The Strang Electric Co., Philadelphia, has been awarded the contract for installing the new electric light system in the Bloomington postoffice. The building has been rewired, the old lighting fixtures removed and new fixtures are being installed.

Brownstown, Ill.—The town has voted $10,000 for a lighting system. Address city clerk.

Cicero, Ill.—A contract has been let to James Sheldon, 106 South La-Salle street, Chicago, for the construction of a $2,000,000 factory for the Western Electric Co. Address General Superintendent Banker, Forty-eighth avenue and Twenty-fourth street, Hawthorne, Ill.

Macomb, Ill.—The council is planning ways and means to own and operate a power plant. Address C. W. Flack, mayor.

Roscoe, Ill.—The Rockford and Interurban railway plans to install a transformer at a cost of about $4500.

Savanna, Ill.—Construction of an electric light line is planned between this city and Argo to furnish the people of that district power for their electric lights. Contract to do the work has been awarded to J. E. Mullen & Son, Savanna.

Springfield, Ill.—The State Utilities Commission has entered an order granting permission to the Athens Electric Co. to supply current to consumers in the vicinity of Indian Point, Fancy Prairie and Cantrell. Power is to be carried over a transmission line to be erected by the company soon.

Urbana, Ill.—The council has been petitioned for ornamental lighting in the northern part of the city. Address city clerk.

Wood River, Ill.—The Central Union Telephone Co. is preparing for an extensive addition to its local exchange, estimated to cost $75,000.

Manitowoc, Wis.—The Jacquet Motor Corp. plans to erect a three-story trunk factory, 150 by 300 ft., in which motors and other equipment will be installed. The estimated cost is $75,000. Address Alfred Jackson, manager.

Merton, Wis.—A three-story factory, 60 by 145 ft., will be erected by the Merton Dairy Products Co., in which motors and other equipment will be installed. The estimated cost is $40,000.

Pulaski, Wis.—The Badger Utility Co. has been organized with a capital of $20,000. The business of the company will be the generation and sale of electrical power and the wholesaling and retailing of electrical appliances and accessories. Address D. Riordan, Fourth street.

Sturgeon Bay, Wis.—Bonds to the amount of $15,000 have been authorized to provide funds to take care of the high-powered current from the Peninsula Service Co. It is necessary to have a higher grade of switchboard and transformer apparatus.

Verona, Wis.—The Verona Light & Power Co. has been incorporated with a capital of $20,000, the incorporators being Walter R. Hinricks, J. B. Donkle and Frank A. Stewart.

Nelson, Minn.—The Nelson Light & Power Co. has been incorporated with a capital of $25,000. The company will build its own line from the plant in Alexandria to Nelson and then west to within a few miles of Carlos, connecting up about 15 farms. Address Fred Sheldon, president.

Boyden, Ia.—The farmers southwest of here will build an electric line in their vicinity to join it with the line of the Boyden Transmission Co.

Maquoketa, Ia.—The Iowa Railway & Light Co. and the Iowa Electric Co. have purchased two tracts of land on the Cedar river and other tracts on the Maquoketa and Wapsipinicon rivers for the construction of power plants. Maquoketa has been the center of large power circuits and will continue as such when the new power plants have been constructed. When the project is completed there will be 12 to 15 plants supplying a continuous load of 12,000 to 15,000 kw. The ultimate plan involves the expenditure of $4,000,000 to $6,000,000.

Butler, Mo.—Plans are under way for the proposed municipal electric power plant, estimated to cost $65,000, bonds for which amount were recently approved. J. F. Smith is city clerk.

Burlington, Kan.—Plans are under way to organize a company with a capital of $25,000 to install an electric light plant here.

Clatonia, Neb.—The electric power plant of H. W. Steinmeyer was recently damaged by fire.

Monroe, Neb.—Electric light bonds have been voted on. Address city clerk.

SOUTH CENTRAL STATES.

Harrodsburg, Ky.—Bonds to the amount of $100,000 have been voted for electric light plant. Address city commissioners.

Memphis, Tenn. — Electric and mechanical equipment will be installed in the proposed plant of the Clover Dairy Farm, for the manufacture of ice cream and other specialties, plans for which are now being prepared. The company recently increased its capital from $100,000 to $350,000 for expansion.

Memphis, Tenn.—Fire on Sept. 7 destroyed the power house and other portions of the plant of the James & Graham Wagon Co., 198 Jefferson avenue, with loss reported at about $100,000.

Greensboro, Ala. — The common council has approved plans for the establishment of a municipal electric plant, to be operated in conjunction with a waterworks system.

Hughes Mills, Ala.—The Wills Valley Light & Power Co., recently organized, is planning the erection of a hydroelectric power plant on Wills Creek. C. C. Appleton and E. W. Wade head the company.

Irvington, Ala.—The Irvington Public Utilities Co. has been incorporated with a capital of $5000. Address W. J. Andrews.

Rogersville, Ala.—The Rogersville Light & Power Co. is planning the rebuilding of its local electric power plant, recently destroyed by fire.

Judsonia, Ark.—Plans are being prepared for the Arkansas Hydroelectric Development Co., Little Rock, for the erection of the first unit of a hydroelectric plant on Little Red river about 18 miles from Judsonia. The project will include 10,500 hp. power plant and dam, and is estimated to cost $1,200,000. Address Dickinson & Watkins, engineers, Little Rock, Ark.

Pine Bluff, Ark.—The Jefferson Cotton Oil Mill Co. is planning the installation of electric motors and other equipment at its plant.

Van Buren, Ark.—The city council is planning ways and means to secure a municipal light and water plant. Address Mayor Payne.

Purcell, Okla.—The common council has approved a bond issue of $18,000 for improvements in the electric lighting system, including extensions to other parts of the municipality. A public election to approve the expenditure will be held at an early date.

Ballinger, Tex.—The city commission is perfecting plans to issue warrants and float them to raise funds with which to install a municipal light plant.

Cleburne, Tex.—The water department, W. S. Hockaday, superintendis planning the installation of electric equipment, air compressor, etc., to increase the present capacity of the municipal waterworks.

El Paso, Tex.—The city council has granted permission to the El Paso Electric Railway Co. to install an ornamental lighting system on Texas street.

Somerville, Tex.—The Somerville Light, Water & Ice Co. has been incorporated here with a capital stock of $50,000. The incorporators are: Hugh Hamilton, R. W. Harlock and Paul Freeman.

Yorktown, Tex.—It is reported that several merchants of this city plan to install private lighting plants and power systems.

WESTERN STATES.

Butte, Mont.—The Rocky Mountain Power Co. will build five dams in the Flathead valley between Bison range and where the river enters the lake.

Miles City, Mont.—A power and irrigation project is being promoted by the Yellowstone Irrigation Co., the estimated cost of which is $500,000.

Colville, Wash.—It is proposed to establish an electric lighting system here.

Portland, Ore.—Plans for the power plant for the Eastern & Western Lumber Co. have been prepared by Strong & McNaughton, Corbett building. The cost is estimated at $25,000.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Milwaukee Electric Railway & Light to Issue Gold Bonds.

An issue of $1,000,000 Milwaukee Electric Railway & Light Co. ten-year 8% sinking fund equipment trust gold certificates will soon be offered by Wm. A. Read & Co. The certificates will be issued under the Philadelphia plan and run for ten years, with a sinking fund of one-twentieth of the total issue provided each six months to purchase and retire bonds in the open market or call by lot at 105.

Southern Utilities Co.

	1920	1919
July gross	$ 215,030	$ 166,415
Net after taxes	37,134	35,139
Total income	37,218	35,643
Surplus after charges.	20,070	18,929
12 months' gross	2,439,469	1,758,220
Net after taxes	456,969	121,024
Total income	458,265	121,795
Surplus after charges	250,818	*53,930

*Deficit.

Southwestern Power & Light Co.'s Subsidiaries.

	1920.	1919.
July gross	$ 749,706	$ 484,952
Net earnings	204,251	161,874
Twelve months' gross	8,028,618	6,094,513
Net earnings	3,121,523	2,131,039

Fort Worth Power & Light Co.

	1920.	1919.
July gross	$ 242,370	$ 104,719
Net after taxes	73,769	47,633
Total income	74,966	48,121
Surplus after charges	58,460	34,674
Twelve months' gross	1,940,487	1,279,686
Net after taxes	936,186	577,481
Total income	945,348	582,254
Surplus after charges	775,132	426,950
Balance after preferred dividends	679,036	341,690

Texas Power & Light Co.

	1920.	1919.
July gross	$ 362,763	$ 260,787
Net after taxes	60,490	73,807
Total income	60,752	73,951
Surplus after charges	3,277	19,376
Twelve months' gross	4,010,734	3,416,505
Net after taxes	1,297,881	1,069,702
Total income	1,303,840	1,075,963
Surplus after charges	638,173	398,902
Balance after preferred dividends	389,673	150,402

Kansas Gas & Electric Co.

	1920.	1919.
July gross	$ 233,289	$ 181,116
Net after taxes	19,162	44,813
Total income	19,734	45,099
Deficit after charges..	28,819	*4,236
Twelve months' gross	3,062,643	2,452,570
Net after taxes	775,598	757,394
Total income	780,412	776,155
Surplus after charges	244,314	315,487
Balance after preferred dividends	81,222	177,667

*Surplus.

Nebraska Power Co.

	1920.	1919.
July gross	$ 221,549	$ 174,154
Net after taxes	58,963	49,105
Total income	61,237	49,431
Surplus after charges	26,959	16,442
Twelve months' gross	2,703,330	2,182,613
Net after taxes	910,704	760,176
Total income	981,918	829,695
Surplus after charges	595,851	501,765
Balance after preferred dividends	385,851	291,765

Northern States Power Co. Sells Bonds.

The Northern States Power Co. has sold an additional block of $1,500,000 of first and refunding mortgage 6% bonds, due in 1941, to the Harris Trust and Savings Bank, the Guaranty Trust Co. of New York, Bonbright & Co., and H. M. Byllesby & Co. The bonds are being offered at 85 and interest, yielding over 7.4%.

Philadelphia Co.'s Subsidiaries.

	1920.	1919.
July gross	$2,388,236	$1,812,331
Net earnings	863,202	564,659
Seven months' gross	19,624,094	16,370,429
Net earnings	8,999,035	7,225,991

Pacific Power & Light Co.

	1920.	1919.
July gross	$ 214,682	$ 185,911
Net after taxes	90,518	92,442
Total income	91,227	93,288
Surplus after charges	46,523	47,169
Twelve months' gross	2,427,252	2,006,812
Net after taxes	1,111,286	927,684
Total income	1,120,100	938,327
Surplus after charges	590,856	395,601
Balance after preferred dividends	399,562	206,601

Consumers Power Co.

	1920.	1919.
July gross	$1,128,462	$ 872,077
Net after taxes	206,004	275,414
Surplus after charges	34,865	139,392
Twelve months' gross	13,074,634	10,518,650
Net after taxes	4,212,515	3,844,563
Surplus after charges	2,340,619	2,119,596
Balance after preferred dividends	1,567,653	1,350,618

Cities Service Co.

	1920.	1919.
August gross	$2,014,224	$1,300,708
Net after expenses	1,957,876	1,249,276
Balance after debenture interest	1,801,888	1,082,735
Dividend on preferred stock	391,993	354,763
Surplus	1,409,894	727,972
Eight months' gross	16,875,443	13,647,249
Net after expenses	16,412,256	13,176,905
Balance after debenture interest	15,127,553	11,894,205
Dividend on preferred stock	3,087,047	2,769,317
Surplus	12,040,506	9,124,888

Commonwealth Power, Railway & Light Co.

	1920.	1919.
July gross	$2,546,612	$2,039,149
Net after taxes	490,055	643,042
Deficit after charges..	94,601	*98,086
Twelve months' gross.	29,162,958	24,138,458
Net after taxes	9,009,564	8,186,447
Surplus after charges	2,272,813	1,802,078
Balance after preferred dividends	1,195,633	724,898

*Surplus.

Dividends.

The Utah Power & Light Co. has declared its regular quarterly dividend of 1.75% on the preferred stock, payable Oct. 1 to stockholders of record Sept. 16.

The Eastern Texas Electric Co. has declared its regular quarterly dividend of $2 on the common stock, payable Oct. 1 to stockholders of record Sept. 18.

The Cities Service Co. has declared the regular monthly dividends of one-half of 1% in cash on the preferred stock, the preference "B" stock and the common stock, and the regular monthly dividend of 1.25% on the common stock, payable in common stock at par, all payable Nov. 1 to stockholders of record Oct. 15.

The Utilities Securities Co. has declared its regular quarterly dividend of 1.75% on the preferred stock, payable Sept. 27 to stockholders of record Sept. 17.

The Westinghouse Electric & Manufacturing Co. has declared its regular quarterly dividend of $1 on its common stock, payable Oct. 30 to stockholders of record Sept. 30. Also a quarterly dividend of $1 on the preferred stock, payable Oct. 15 to stockholders of record Sept. 30.

The Habirshaw Electric Cable Co. has declared its regular quarterly stock dividend of 37.5 cents, payable Oct. 1 to stockholders of record Sept. 20.

The Springfield Railway & Light Co. has declared its regular quarterly stock dividend of 1.75%, payable Oct. 1 to stockholders of record Sept. 15.

WEEKLY COMPARISONS OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

	Div. rate. Per cent.	Bid Sept. 14.	Bid Sept. 21.
Public Utilities—			
Adirondack Electric Power of Glens Falls, common	6	13	13
Adirondack Electric Power of Glens Falls, preferred	6	70	70
American Gas & Electric of New York, common	10+extra	90	92
American Gas & Electric of New York, preferred	6	34½	35
American Light & Traction of New York, common	..	111	112
American Light & Traction of New York, preferred	6	81	81
American Power & Light of New York, common	4	43	46
American Power & Light of New York, preferred	6	67	68
American Public Utilities of Grand Rapids, common	..	7	6
American Public Utilities of Grand Rapids, preferred	7	14	14
American Telephone & Telegraph of New York	..	99	100½
American Water Works & Elec. of New York, common	..	2	2
American Water Works & Elec. of New York, particip	7	4	4
American Water Works & Elec. of New York, 1st preferred	..	38	38
Appalachian Power, common	..	1	1
Appalachian Power, preferred	7	15	13
Cities Service of New York, common	+extra	295	293
Cities Service of New York, preferred	6	66	66
Commonwealth Edison of Chicago	8	101	101
Comm. Power, Railway & Light of Jackson, common	..	17	15
Comm. Power, Railway & Light of Jackson, preferred	6	36	36
Federal Light & Traction of New York, common	..	6	6
Federal Light & Traction of New York, preferred	..	38	42
Northern States Power of Chicago, common	..	30	30
Northern States Power of Chicago, preferred	ex.div.7	76	75
Pacific Gas & Electric of San Francisco, common	..	48	48
Public Service of Northern Illinois, Chicago, common	7	65	65
Public Service of Northern Illinois, Chicago, preferred	6	84	83
Standard Gas & Electric of Chicago, common	..	12	12
Standard Gas & Electric of Chicago, preferred	6	34	35
Tennessee Railway, Light & Power of Chattanooga, common	..	1	1
Tennessee Railway, Light & Power of Chattanooga, preferred	6	2	2
Western Power of San Francisco, common	..	18	18
Western Union Telegraph of New York	extra	86	87
Industrials—			
Electric Storage Battery of Philadelphia, common	4	120	121
General Electric of Schenectady	8	142	143
Westinghouse Electric & Mfg. of Pittsburgh, common	7	48	48